



FRIDAY, FEBRUARY 5.

## The Telegraph as Applied to Train Movement.

[From a forthcoming work by J. J. Turner, Superintendent, First, Third and Fifth Divisions, Chicago, St. Louis & Pittsburgh Railroad.]

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## III.

CHAPTER XI.—Forms for Orders.—The most important item in the whole system of train-dispatching is that orders shall be understood.

Therefore, to prevent a dispatcher educated in one school from issuing to a conductor and engineer, educated in another school, an order the wording of which makes the meaning obscure to the men receiving it, it is common practice to give established forms to the orders most frequently used.

These forms are given, and their meaning explained, in the rules adopted by the road, giving men an opportunity to study them at times when the cares of a train are not burdening them. They then, with their meanings, soon become so familiar that they are recognized on sight, and are instinctively properly obeyed.

The movements supplied with forms are generally the following: "the positive meeting point," which fixes a point at which trains moving in opposite directions shall meet; "the positive passing point," which fixes the point at which a train shall be passed by a train running in the same direction; "the regardless order," which gives one train a right to run for a certain distance over track upon which an opposing train is due; "time-orders," which suspend the rights of superior trains for a time, and within certain limits, and allow inferior trains to use the track within this time and limit against them; "the signal order," which is a notice to trains to carry signals, indicating the position of each in a convoy; "orders for extras," which is used to run a train over the road at a time when the time-card does not provide for one; "work-train order," for giving work-trains the right to use the track, within fixed limits and in either direction, between the time of regular trains; "holding order," to agents or operators, instructing them to prevent a certain train from passing until some train has arrived, or certain other conditions have been fulfilled; "annulling order," abolishing, for the day, a train which by the time-card should run, or destroying an order which has been issued; and "order for converting double into single track." The wording of these forms are made to suit the preferences of those in authority. It is not necessary to consider the words in which they are made in the chapters discussing each of them; therefore, no reference is made to the wording, only the effect of the movement being considered.

CHAPTER XII.—The Positive Meeting Point Order.—The positive meeting point order directs two trains as to where they shall meet, and abolishes all rules of superiority or time as between them, which would otherwise decide the meeting point. Their meeting at that point is, therefore, absolute, and is not affected by lapse of time or other considerations. Each runs to the designated point entirely without regard to the other; and, having arrived, awaits indefinitely the other's coming.

One of the first requisites of train-dispatching is to so arrange matters that, as nearly as practicable, under all possible conditions, some of the trains involved in each movement will be kept in motion. The preference should be, at all times, given to the superior train.

If trains are a great distance apart when this order is given, many circumstances may transpire to delay one or the other before the meeting point is reached, and the one which is not delayed, and would have been, from that point, able to proceed, will be held an equal length of time with the other. The delay to one transmitted in this way to the other, doubles the total detention to the train movement.

In the case of trains of different classes, assume that a passenger and a freight are ordered to meet at a point. Now it is evident that it is of more importance that the passengers reach their destination at the earliest possible moment, than that the freight should be saved a delay of 15 minutes or more, yet the passenger train will, under the order, be held until the freight arrives. Then, freight trains are much more liable to delays than passenger trains, and this order not only makes the passenger train liable to detention from its own mishaps, but also from those of the freight train. It follows, then, that this order should not be given when trains are a long distance apart, nor to trains of different classes.

The order is a very useful one to pass trains of the same class when they are close together, before an order is seen to be necessary. The order is peculiarly well adapted to cases in which large numbers of trains are congregated upon portions of the road where siding room is scarce, and where delays have already occurred, so that the problem is not to give them a clear track but to collect only so many at any point as the siding there will hold.

CHAPTER XIII.—The Positive Passing Point Order.—The positive passing point order differs from the positive meeting point order in that where the latter designates the point at which trains going in opposite directions shall meet, the former designates the point of passing of trains going in the same direction.

Where the train passing to the front is inferior to the train

passed, it is not usually considered sufficient for them to receive an order to pass; they must, in addition, receive instructions to continue in advance of the superior train.

CHAPTER XIV.—The Regardless Order.—The regardless order is used to run one train a certain distance without regard to the time or superiority of another, and relegates the question of the meeting point to the time-card and rules beyond that point.

For illustration, trainmen on an east-bound train, receiving an order that a train west-bound will run to a point regardless of them, knowing that at any point west of the one named the order has no effect, will proceed on the privileges given their train by time-card and rules.

East of the point named, their privileges have been curtailed, the order reading plainly that the train moving west is paying no attention to their train. As the regardless order gives neither train authority to pass any station ahead of its time as designated on the time-card, the east-bound train can pass east of the regardless point, provided it can do so and clear the time of the opposing train at some side-track. But if they can not clear the time at some point east they must remain at the point named until the arrival of the west-bound train.

When the train whose rights are curtailed has time to pass beyond the point at which its rights are curtailed by clearing the time of the train whose rights are extended, this order is not open to the objections urged against the positive meeting point.

This order has precisely the same effect as the time-card has in cases where trains in one direction have, by general rule, the right of the road over those of the same class in the other, excepting that the order applies only to the two trains mentioned, and for but one day, and for a limited distance, while the rule is general in its character and applies to every train and every day, and for the entire length of the road.

It frequently occurs that a train is to be held at some point, but the length of time cannot be known. It is then very convenient to run another train to that point regardless of it. This, while giving to one the advantage of all the delay which may happen to the other, allows the train held to proceed toward the train running regardless, at any time it can do so and make a station in its direction before the regardless train is due there. When the train run regardless of can pass the point and run against the other train, by clearing its time, this order is not subject to so many of the liabilities of delay as the positive meeting point.

But in some other cases it becomes in effect a positive meeting point. For example: Where the east-bound train runs by time-card regardless of the west-bound. If a west-bound behind time is run regardless of the east-bound, also late, to a certain point, a positive meeting point is made there, for west of the point where the order is not in effect the east-bound is running regardless by time-card, while east of that point the west-bound is running regardless by the order.

As both are too much delayed to pass beyond by clearing the other train, they merely run to the point without regard to the other, and there indefinitely await its arrival. As this is exactly what is done when a positive meeting point is made the same objections hold against it.

CHAPTER XV.—The Time Order.—The time order is the most useful of all. It, better than any other, serves to prevent the cumulative delays heretofore mentioned.

It has been shown how, in positive meeting point orders, delays to one train are reflected to the other, the effect thus being doubled, and how, under certain conditions, the regardless order has the same disadvantage.

The time order has the advantage of giving one train the benefit of every known delay to a second, and at the same time keeping the second entirely unaffected by detentions to the first.

There are two movements to be governed by this order:

First. To move a train in one direction against one in the other.

Second. To move a train ahead of one moving in the same direction.

In the first, the time that the delayed train should pass some station being approximated, the other is given until this time, or nearly so, to make the station selected. The order is worded about as follows: "Train No. 22, engine 73, can have until one fifteen (1:15) a. m. to make Bushrod for train No. 7, engine 32." The men in charge of the train receiving the time (in this case No. 22) disregard the time of the other (No. 7) as shown on the time-card, and occupy the main track against it until the station named (Bushrod) is reached, or until the time given has expired, in either of which events they put their train on the nearest siding, and keep it there until the train against which the time was given passes. The order says the train against which the time was given will not leave Bushrod before one fifteen, but it says nothing about a subsequent station, three miles off, which it may pass at any time it can. The train receiving the time, having no data beyond Bushrod excepting the time card, is, therefore, required to stop there unless it can clear the time of No. 7 at some point beyond; but, if the train dispatcher has good judgment, the trains will have received the greatest time and distance they can physically make, and it seldom if ever occurs that they have time to pass beyond the station named.

The latter train (No. 7) does not pass the point designated before the time named, unless the first is already there, but at that moment proceeds, whether it has arrived or not.

It is well to bear in mind in this connection that whether the train given the time reaches the point named or not it is not required to be out of the way of the other before the moment named.

In the second case the same calculation is made, and, in effect, the same order given, but the conditions being slightly different, of necessity the wording must be changed,

In the case of trains moving to a station from opposite directions, it has been shown that 1:15 is the time for one to clear the track for the other, and that the time mentioned in the order is the moment the train against which it is given may pass a station in the direction from which it is expected. In this case the difference in the conditions is that the trains are both on the same side of the point at which they are expected to pass, and a time at that station cannot be erected as a barrier between them. This barrier must, therefore, be put up behind the train running ahead of the other, and as it will be getting farther and farther away from any one station, instead of nearer and nearer, as in the other case, it is necessary that the barrier follow along with it.

The time-card, giving the time at all stations, furnishes the best means of calculation, and the order reads: "No. 7 will run two (2) hours late from Becknell to Bushrod." A train receiving this order at Becknell runs toward Bushrod, occupying the main track, which would be, in the absence of an order, occupied by No. 7, but arranging to be on the siding at Bushrod, or any point between there and Becknell, by the time No. 7 is two hours late, at the point reached, and No. 7 runs two hours later than its time as shown on the time-card between the points named. Each station is then in turn the barrier until No. 7 becomes two hours late there.

This latter order is sometimes used to run trains both against and ahead of others, but the first form is usually found to give better satisfaction to govern the movement for which it is named.

When an order of the second form is given, care should be taken by dispatchers to make the time some figure that is easy to add to the time-card, avoiding such as 17, 23, etc., which are hard to add mentally to figures, reading 1:49, etc., etc.

It will be seen that if a dispatcher is able to decide nearly what time a superior train will pass the different points, inferior trains may, by these forms, be given the advantage of every moment of the delay without detentions on their part having any reflex whatever on the superior.

CHAPTER XVI.—Signal Orders.—In the first chapter mention was made of the necessity of running trains in convoys, that is, more than one at an hour when the time-card provides for one only. This is termed running a train in sections, and all of them are known by the same number. They are distinguished by a numeral-adjective prefacing the number; as first No. 2, second No. 2, etc., in the order they proceed. These sections are treated not as parts of the same train, but as individuals, each having the same authority to use the track as if it were the only one, with the single exception that they may not change their position in the convoy.

Trains meeting the first section are notified of the existence of a second. They then act just as if none had passed, and the second section becomes to them just what the first was up to the time of its arrival. If, upon the arrival of a second, a third is seen to be following, it in its turn becomes the train called for on the time-card.

Trains do not always meet all sections of others at one point. If, after the first has passed, the second becomes so delayed as to give the awaiting train the right to proceed, it will go just as it would have done against the first section, had it been similarly detained.

It is necessary that all parties interested should know when there is more than one section under any number. It is, however, not necessary that they should have this information before the arrival of the first, because they evidently can have nothing to do with following sections until they have encountered those preceding.

To give this notice, it has become common practice to display a signal or signals of some kind, usually colored flags, on the engine or some other convenient place, of each section excepting the last.

Not only is this the most convenient means of conveying the information, but it is the safest. If crews were informed by telegraph of the number of sections in each opposing train and were without other means of ascertaining it, they would have to be advised of every change made, which would be confusing. It would require quite an effort of the memory to keep in mind how many of each had gone and how many were yet to come. By the signal plan they never have more than one on their mind at any time; they know when they meet the first that there is another, and this other is the only one which concerns them. The first, having passed, is no longer a factor in their movement, and they know nothing of a third.

A train without these signals is the last of that number, and the train is done for that day.

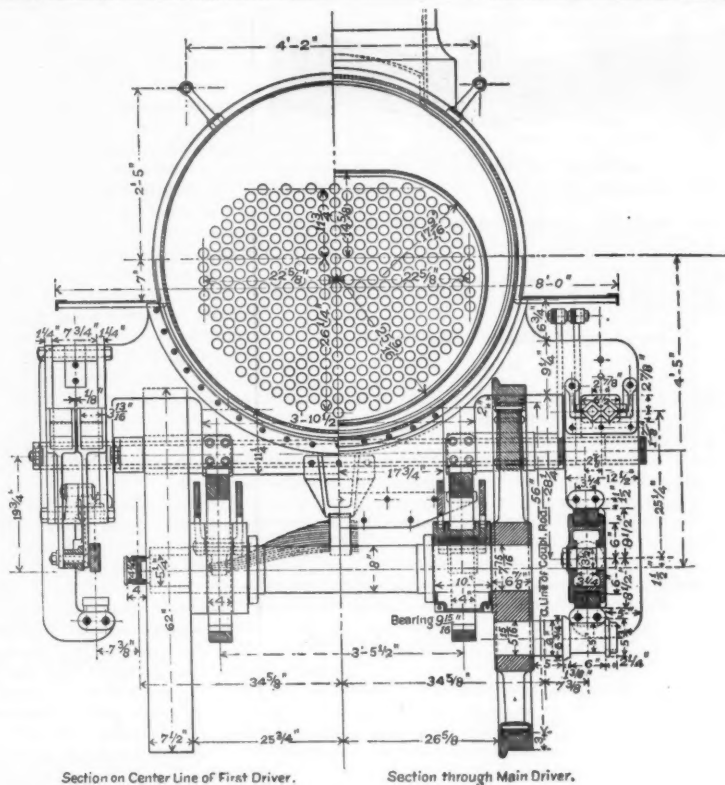
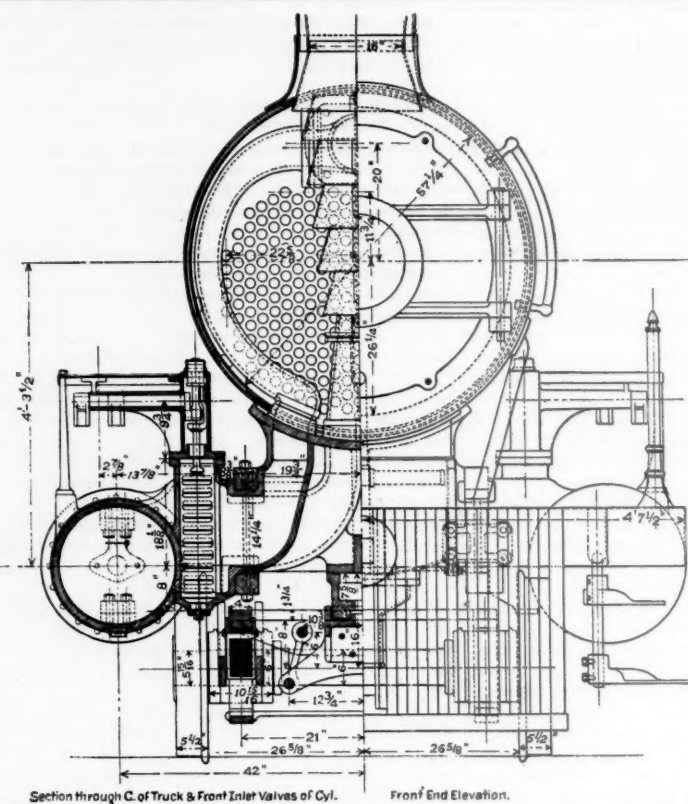
The signal order is used to notify trains to carry signals, and at the same time to inform them of their position in the convoy.

CHAPTER XVII.—Extras and Work-Trains.—When found necessary, trains are run by "orders," at a time when there is no time-card provision made for them. To distinguish them from the regular trains appearing on the time-card, they are called irregular or extra. When authorized to run in one direction, they may not occupy the track running in the other. Work-trains use the track between designated stations, known as their limits, running in either direction, at times when it is not assigned to regular trains.

The necessity of the clearest understanding of all concerned in the use of the track, as to when, where and how they shall use it, has brought out the practice of allowing no train or engine on the track unless filling, by proper authority, some of the numbers given by the time-card, or else with an "order" to use it extra, or as a work-train.

Perhaps more serious accidents, caused by errors in train-dispatching, have occurred with trains of this character than any other. Two such trains approaching have no means of knowing each other's whereabouts, or indeed of their existence, except as they are notified by the dispatcher, and it





## EXPRESS LOCOMOTIVE.

Designed by MR. GEORGE S. STRONG, Philadelphia.

devolves entirely upon him to get them safely past each other.

It is unsafe to run two extras toward each other upon single track, unless their orders are so worded that they cannot get nearer than the distance between two telegraph stations, without further instructions, or else with an order each to meet the other at some given point. An extra should never receive an order which will take it over track occupied by a work-train, nor should the limits of two work-trains be allowed to overlap.

Upon roads where the necessity is apt to arise of running extras frequently, work-trains should be confined within the narrowest possible limit that will enable them to work economically, and should be required to report at some telegraph office at a stated time. Then if it becomes necessary to run an extra over the road, it can be sent as far as the nearest end of the work-train limits, and as soon as this train reports, a meeting point can be made and both allowed to proceed.

It is urged that it is safe to run an extra through work-train limits, when each is notified not to move without being preceded by a flagman, and many very pretty arguments are brought forward to prove its safety. Theoretically it works admirably, and the flagmen are always a half a mile or so in advance of their trains, but those of us who have been associated with these men know that the easiest way to flag is to let the engine carry them, either in the cab or at most on the pilot, and that this is the way that it is done.

It may be said it is unsafe and improper to run extras against work-trains, or each other, or *vice versa*, without positive instructions given to all concerned where they are to meet or pass.

## Strong's Express Locomotive.

The accompanying engravings illustrate a novel form of locomotive, which has been designed and patented by Mr. Geo. S. Strong, of Philadelphia. The engine, which is now under construction is intended to haul heavy passenger trains at a high rate of speed over the steep grades on the Lehigh Valley Railroad. The engine differs in many important points from other locomotives, especially in the construction and movement of the valves, the form of the fire box, and the arrangement of the wheel base.

The valves are moved wholly by the motion of the connecting rod, no eccentrics being used. The arrangement for reversing and varying the point of cut-off is noteworthy and avoids all sliding, rubbing surfaces, and gives at the same time a firm support to the movable fulcrum, the position of which determines the degree of expansion, and the direction in which the engine runs.

The fire-box is formed of two Fox's corrugated flues, or cylindrical furnaces, placed side by side as in the ordinary Scotch marine boiler. The grate-bars are placed in these flues, and the flames pass over a brick arch or wall at the end of the grate into a combustion chamber of considerable size. The products of combustion then pass through a considerable number of small boiler tubes, and thence to the smoke-box and stack.

Fox's corrugated flues or cylindrical furnaces have been very largely used in steamships and stationary boilers. Over 10,000 are now running, and no less than 1,656 were ordered during the past year for ships with triple and quadruple expansion engines alone. The flues as now used in marine practice range from 36 in. dia. to 56 in. dia. and from  $\frac{1}{8}$  in. to  $\frac{3}{8}$  in. thick. The working pressures vary from 100 lbs. to 180

lbs. per sq. in. The employment of Fox flues in locomotives has often been proposed, but has never been previously carried out. The high pressures now used at sea approach so nearly those common in locomotives that there is little doubt that the strength given by the corrugations will enable the flues to safely withstand the highest pressure now used on locomotives.

Flat stayed surfaces were once a prominent feature in the marine boiler, but have been abolished by the almost universal adoption of the Scotch boiler and plain cylindrical or corrugated furnaces. The abolition of stays has cheapened the cost and maintenance of marine boilers, besides effecting a considerable saving in weight, and facilitating cleaning and inspection. It is quite within the range of possibility that the use in a locomotive of a form of fire-box which dispenses with stays will also be attended by important economies, and its advent will be looked upon with much interest.

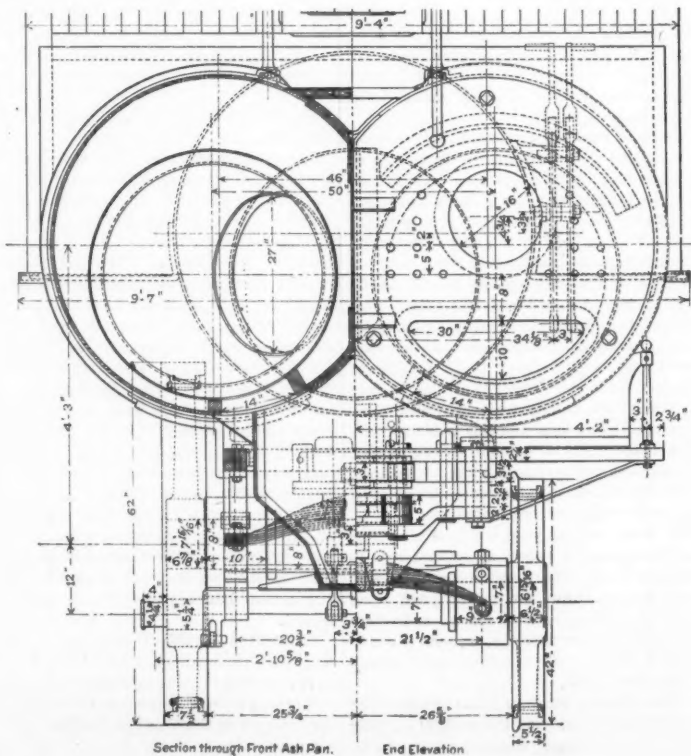
Hitherto, a deep fire-box has been found essential to the economical and complete combustion of bituminous fuel on a locomotive. Whether the shallower fire-box formed by a Fox flue, which answers well on marine boilers, will afford sufficient space for the complete mixture and combination of the gases in the more rapid combustion on a locomotive is a question which a practical trial can alone solve. The large combustion chamber may possibly prove an efficient substi-

tute for the deep fire-box, and provide sufficient time and space for complete combustion. It will be noticed that provision is made for the admission of air to the combustion chamber in order to burn any uncombined gases. Mr. Strong's method of construction appears, however, to be well adapted for anthracite coal, where great depth of fire-box is of little importance, while a large grate area appears to be essential.

The small amount of staying required by a Fox's flue, and the method in which it expands and contracts without the undue strains on other parts of the boiler give it great advantages over an ordinary locomotive fire-box. It will probably be found that the alternate expansion and contraction of the flue makes such a change in the curve of the corrugations that the scale will crack off each time the boiler is allowed to cool down.

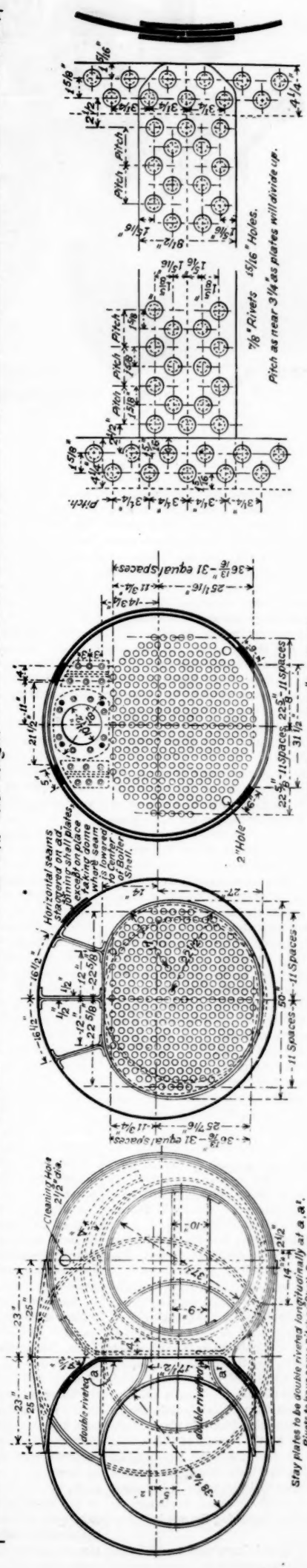
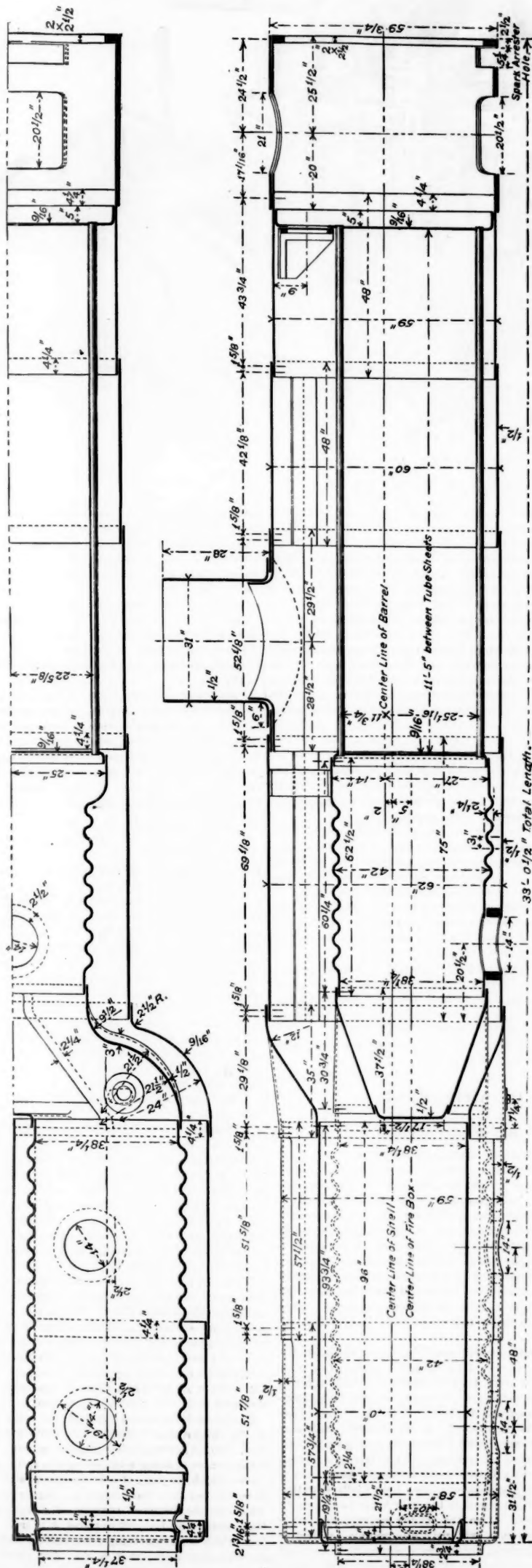
The length and weight of the engine are considerably increased by the long combustion chamber, but Mr. Strong believes that the more complete combustion of fuel will effect a saving which will more than counterbalance any disadvantage thus caused.

The engine is specially designed with a view to exert at high speed a tractive power exceeding that of any existing engine. It is also the intention of the designer that the en-



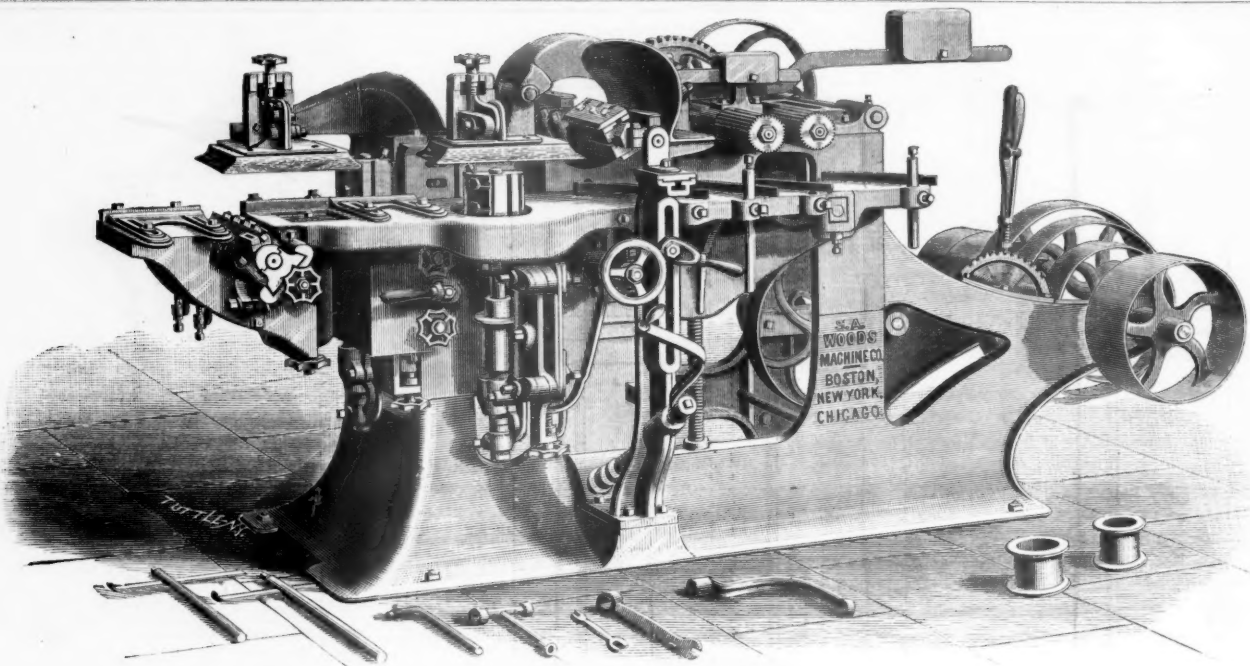
## EXPRESS LOCOMOTIVE.

Designed by MR. GEORGE S. STRONG, Philadelphia.



BOILER FOR EXPRESS LOCOMOTIVE.  
Designed by Mr. GEORGE S. STROSS, Philadelphia.





OUTSIDE MOLDING MACHINE.

Built by the S. A. WOODS MACHINE CO.

gine shall emit no sparks or smoke, and that the combustion shall be so perfect that the maximum possible duty shall be developed from each pound of coal burnt. Economy is to be further promoted by the special form of valve gear adopted, which is calculated to give a very high average pressure in the cylinder with an early cut-off. An engine with similar valve gear is now running on the Lehigh Valley, and has given very encouraging results in this direction. The valves and valve gear will be fully described and illustrated in a subsequent issue, but a brief description may be useful.

Four valves, two steam, and two exhaust, are employed for each cylinder. The valves are gridiron slide valves moving vertically, and working against faces planed on fixed vertical cylindrical plugs, which are pierced by numerous ports. The plugs are placed near the ends of the cylinders, and the steam passages are consequently very short, the clearances are very small, and amount to only 4 per cent. of the total contents of the cylinder.

The reduced clearance effects an economy of steam, and though the exhaust is open until near the end of the stroke, the small clearance causes a rapid increase of compression, which at the end of the stroke nearly reaches the boiler pressure.

The exhaust is constant, the points at which the exhaust opens and compression commences remaining unaffected by any change in the degree of expansion. The movement of the steam valves is somewhat peculiar. By means of an arrangement of bell crank levers the steam valve remains nearly stationary during a large portion of a stroke of the piston. As the steam valve therefore practically only moves to open and shut, its travel is very small and chiefly takes place during compression and just after the cut off, when the pressure of steam in the cylinder is considerable, and tends to lift the valve off its seat and neutralize the pressure of the steam in the valve chamber. This is found to diminish the wear of the valves in an engine now running on the Lehigh Valley with a similar arrangement of valves.

The engine embodies an unusual number of important and promising departures from existing practice, and its performances in actual service will be awaited with considerable interest. We understand that the engine will be ready during the month of May.

#### Outside Molding Machine.

The accompanying engraving represents a new pattern of outside molding machine, constructed by the S. A. Woods Machine Co., of Boston, New York & Chicago.

The machine works on all four sides, the top and bottom heads are 7 inches, and the table drops 14 inches. The total weight of the machine is 2,500 lbs.

The frame is constructed so as to give strength and solidity to the working parts, having a broad base curving out to give direct support to the outside bearing of top cutter head. The table which carries the under head and both side heads is raised and lowered by the crank shown in the cut, which is so placed as to be easily reached by the operator, and which connects with two screws, so geared as to move with ease. The screws are 1½ in. in diameter, giving a substantial support to the bed. A half turn of the handle shown behind the outside head holds the table firmly in place, while a similar turn of the handle at the support of the outside bearing clamps the base, the movable table and top head all solidly together. By loosening two bolts the upper portion of the standard may be removed entirely, when it is desired to work on one edge of very wide stock, or to change the top head. The box is removed by loosening the one bolt that works in the slot shown.

Both side heads are carried up and down with the bed, and are arranged to be adjusted, set at an angle, moved out or in, and raised or lowered from the front or work side of the machine. The heads are slotted on four sides, and the side

heads are secured to the spindles by set screws placed obliquely in the upper end of the head, as shown in cut, leaving all four sides of the head free for cutters. All four heads have an endwise adjustment, controlled each by a hand wheel. The feed consists of two top and one bottom roll, all driven, the two top rolls hanging in a rocker frame in such a manner as to rest firmly on the stock independently of each other, however uneven the lumber, while the under roll is driven at all thicknesses. The fluted rolls can be readily removed for spur feed when desired, and if the spurs used are of different diameter than the rolls, the driving gear for the under roll may be disconnected by a clamp bolt, thus making an idle or friction roll of the bottom one. The tension of the feed belt is controlled by the upright lever, and three speeds of feed can be obtained, which are adapted to all classes of work.

The top pressure bar is heavily weighted, and may be set as near the cutting edge as desired, having sufficient adjustment for all lengths of cutters. The opening for the under cutters may be as wide or narrow as desired, by moving the mouthpiece at either side of the opening.

The boxes and bearings throughout the entire machine are so constructed that the belts pull against the bed of the boxes, instead of the caps, and against the main portion of the frame whenever there are adjustments or connections. The cap screws and connecting bolts are thus relieved from strain.

The "hold downs" or top pressures adjust themselves, conforming to the surface of the stock, and giving a reliable and firm pressure at all times. The side springs are so placed as to hold the stock firmly in position.

The end table may be tipped down by loosening the bolts from the loop slot shown, giving free access to the under cutters. This can be done without moving any of the guides, or even when stock is being worked, so the operator can see exactly how to set and adjust the under cutters.

The back side head, being located outside of the main frame of the machine, is easy of access.

#### Contributions.

##### Rail-Joint Problems.

TO THE EDITOR OF THE RAILROAD GAZETTE:

In a recent letter in the *Railway Age*, by Mr. W. F. Gould, on rail-joint splices, I note that the angle-bar splice and suspended joint may be regarded as a practical failure, and that "it must go." This is an opinion that Mr. Gould is entitled to hold and express, but how far his opinion may justly influence others must depend very largely upon the extent to which the statements made by him appeal to our judgment. I am not a warm adherent of the angle-bar and suspended joint, nor of any other joint, but would like to feel that when we throw aside this joint we do so because its good and bad points have been fairly appreciated and balanced in just scales.

First, as to the statements quoted by him as made by Mr. Becker, that 27 per cent. of the angle-bar splices in six miles of newly laid track were found broken by tearing apart of the fibres of the upper leg of the angle, the bars being practically new and road well ballasted. I think this must have been due to special causes. As to Mr. Becker's statement that breakages occurred with marked frequency on smooth, perfectly built floors, bridges, etc., it is to be regretted that he should have confined his address to concise statements of facts, with so little discussion of causes. I especially wish that he had stated at what season of the year his most prominent data were obtained. If in the winter months, the lower temperature which rails will naturally assume on bridges may be one explanation, for 20 years' observations in direct connection with maintenance of way cause me to say that a disproportionate number of splices break, in track laid on superstructure, as against breakages in track laid on road-

bed, in winter months. But in the summer months the number broken on superstructure is less than on road-bed.

Mr. Gould says that the reason why the new angle-bar breaks more readily than the old one is because it fits better in the rails its entire length. This statement is not based on facts; the fit is no better. The reason that more angle-bar splices break now-a-days than we formerly broke of the old plain splices is a good and tangible reason. The old plain splice is symmetrical in shape; its neutral axis of metal lies in the centre of the bar. In the angle bar it lies much nearer to the base, producing much greater tensile strains in the upper edges.

I am not an ardent advocate of the idea of absolutely controlling and resisting cantilever action at rail ends. I should prefer to accept such motion as legitimate and endeavor to reduce its undesirable results to a minimum. It is this bending which the fish-plate tries to resist, which makes the trouble, but Mr. Gould says it is the end of a splice (I presume he means the excess beyond bolt-holes) which furnishes the leverage to rupture itself. This comment I dissent from.



If a splice is a good fit and properly secured, the length of splice which transmits to its own centre a rupturing force is a length each way from the centre, not to exceed three times the width of the bar between its contact edges. If one will take a track nut and increase it to one side only of the bolt-hole to form its square into an elongation which will fill the opening in a track wrench, to back of the opening between the jaws, as in the small cut, I do not imagine the trackmen would find any less muscle required on their jaw wrenches to tighten up such nuts.\*

The excess length of a splice bar is not injurious to the bar, as the splice and rail become one body after the splice passes along the rail for a limited distance. And if the fit is good and the bolts long enough, a splice bar 12 in. long will be ruptured as readily as a bar 12 ft. long.

Is the injury which the ends of rails suffer due to the direct load?

I think not, but the loaded rail is depressed and the result is a blow administered to the protruding rail head, resulting in two motions in that rail, forward through its entire length and downward for a certain portion only, close to and at its protruding end. I note on double track a marked difference in wear and abuse received at one end of a rail, from what is shown at the other end. In single track both ends are damaged much alike, so we may regard injury to rail head to be the result of wheels coming upon it, and not to an appreciable extent from wheels leaving it.

As to Mr. Becker's conclusion that splices in loose or otherwise poor condition break readily, I agree with him, and dissent from Mr. Gould's views. A loose splice in place suffers much more severely than does a splice in proper condition, on the simple ground that it is easier and less disastrous to hold up a weight of say 50 lbs. on one's head than it is to stop a falling 50-lb. weight by the same means. A loose splice bar in place has to do at a disadvantage what a tight bar is prepared to do with least injury to itself.

It may be, indeed, that the angle-bar splice must go; if so, let it go with a clear understanding of its actions and capabilities. That it has frequent ruptures is to me an evidence that it comes nearer to doing what we want a splice to do than other splices which see years of service without sign of the conflict in which they have been engaged. During the late war we always held the shattered remains of a fighting regiment in high esteem; broken, cut to pieces, it is true; but they had been where work was being done, and had done, or tried to do, what they were put in to do. The plain splices, chair s

\* [This is true, but on the other hand, it will be just so much easier for the trackman, with the same force applied to the nut to strip the thread or twist off the bolt.—EDITOR.]



Comparative Exhibit of the Theories Entertained by Prominent Chief Engineers as to Splice and Rail Borings and Expansion Allowances at Rail Ends with reference to their Thermometrical Ranges, as shown by their Practice in January, 1885.

[Rails all 30 ft. long.]

RAILROAD.	OFFICER.	Weight of rail per yard.	Make or style of splice.	Space borings of rail.	Space borings of splice.	Greatest opening between rail ends.	Thermometrical range.	Lowest thermometrical point for laying steel.
Chic. & Alton.....	K. F. Booth*.....	60 and 70	24 Angle-bar $\frac{3}{4}$ thick.	$4\frac{1}{2}$ $5\frac{1}{2}$ $4\frac{1}{2}$	$4\frac{1}{2}$ $5\frac{1}{2}$ $4\frac{1}{2}$	$\frac{5}{16}$	.....	+20°
Wabash, St. L. & P.....	W. S. Lincoln*.....	60	Angle, Supported joint.	$5\frac{1}{2}$ $5\frac{1}{2}$ $5\frac{1}{2}$	$5\frac{1}{2}$ $5\frac{1}{2}$ $5\frac{1}{2}$	$\frac{5}{16}$	-20 to + 98	.....
Chi. & N. W.....	F. H. Johnson*.....	50 to 56	Angle, Suspended joint.	$4\frac{1}{2}$ $4\frac{1}{2}$ $4\frac{1}{2}$	$4\frac{1}{2}$ $4\frac{1}{2}$ $4\frac{1}{2}$	$\frac{5}{16}$	-39 to +100	.....
C. R. I. & Pacific.....	H. A. Parker,† Div. Engr.	60 and 65	22½ Angle, Suspended joint.	5 5 5	5 5 5	$\frac{5}{16}$	-30 to +105	+30°
Boston & Albany.....	W. H. Russell*.....	60	Angle.	6 5½ 6	6 5½ 6	$\frac{5}{16}$	.....	.....
Chi., Mil. & St. Paul.....	D. J. Whittemore*.....	Main Line, 67	24 Angle.	6 5½ 6	6 5½ 6	$\frac{5}{16}$	-10 to +100	0°
Lehigh Valley.....	A. W. Steadman*.....	Branches, 60	35 and 42 Angles.	9-6-5½-6-9	9-6-5½-6-9	$\frac{5}{16}$	-30 to +140	+45°
Michigan Cent.....	J. D. Hawks*.....	58, 66 and 76	44 Angle with 6 bolts.	6 8 6	6 8 6	$\frac{5}{16}$	-20 to +100	+50°
N. Y., Lake Erie & West.....	O. Chanute,‡ Cons. Engineer.	65	24 Angle.	5½ 6½ 5½	5½ 6½ 5½	$\frac{5}{16}$	120°	-30°
Chic., B. & Q.....	G. C. Smith*.....	66	Angle.	5 6½ 5	5 6½ 5	$\frac{5}{16}$	-10 to +100	+40°
Pennsylvania.....	Wm. H. Brown*.....	60, 67 and 74	Angle.	5 7½ 5	5 7½ 5	$\frac{5}{16}$	-50 to +100	+32°
Central Pacific.....	Wm. C. Curtis,* Supt. Track.	50 and 60	Angle.	6 6 6	6 6 6	$\frac{5}{16}$	-35 to + 95	+30°
Grand Trunk.....	E. P. Hannaford*.....	65	Angle 24.	9 8½ 9	9 8½ 9	$\frac{5}{16}$	120°	0°
West Shore.....	Walter Katté*.....	67	36 Angle.	5 8 5	5 8 5	$\frac{5}{16}$	-50 to +100	+40°
Baltimore & Ohio.....	J. L. Randolph*.....	56	Angle.	5 6 5	5 6 5	$\frac{5}{16}$	-50 to +100	0°
St. Paul, Minn. & Man.....	N. D. Mille*.....	60	Angle, Suspended joint.	6 5½ 6	6 5½ 6	$\frac{5}{16}$	-30 to + 90	+32°
N. Y., Pa. & Ohio.....	Chas. Latimer*.....	65	Angle.	6 5½ 6	6 5½ 6	$\frac{5}{16}$	.....	.....
L. S. & Michigan So.....	L. H. Clarke*.....	56	Plain splice.	6 5½ 6	6 5½ 6	Calculated Practically $\frac{5}{16}$	-50 to +100	0°
Northern Pacific.....	Construction Department.....	56	Angle.	6 5½ 6	6 5½ 6	.....	.....	.....
Northern Pacific.....	Operating Department.....	56	Angle.	6 5½ 6	6 5½ 6	.....	.....	.....

\* Chief Engineer.

† Division Engineer.

‡ Consulting Engineer.

Expansion 30-ft. rail,  $\frac{1}{8}$  in. for 50°.

and many other joints last for years; they are the home guards; they do little and suffer little in themselves. I we are to throw out our angles, let us feel that we have not done it on a popular vote, or mob law, but because their merits and demerits have been carefully discussed, and their condemnation is on grounds that may not be revoked in years to come by our successors.

I did not note in Mr. Gould's letter nor did I see in Mr. Becker's address any data giving the rails and splice borings of the faulty angle-bar joints. Now there are angle-bars and angle-bars, borings and borings of rails. I am conversant with one prominent line in the Northwest, on which the rail is 56 lbs., borings for angle-bar in rail are  $4\frac{1}{2}$  in.  $4\frac{1}{2}$  in.  $4\frac{1}{2}$  in. and I figure from personal observations that on one piece of track on which I walked for some miles, that 20 per cent. of their angles are ruptured: a very bad result. On another road 56-lbs. rail, bored 6 in. 6 in. 6 in. has no broken or ruptured angles, and the general results arising from their use are fairly satisfactory. The table herewith shows the varying practice of many lines.

I have for my daily associates and co-laborers, fifteen as good roadmasters as there are in the Northwest, and for a good roadmaster I have an especial regard, holding such a man to be the main stay of a division. Yet, when it comes to the discussion of a fact, and resolving the same into its causes, I should be slow to discard the conclusions of the Technical Committee of the German Railroad Union, and accept the contrary views adopted by the Roadmasters' Association, simply because our roadmasters are practical men. Our best successes in the arts and manufacture have been obtained from putting into practical effect the solutions obtained in the offices and laboratories of our scientists. In putting up the first cantilever bridge structure in America (Kentucky River bridge) it was deemed advisable by the Chief Engineer to rivet up the cantilever joint in the lower chord to aid me in erection, as we were about 300 ft. above stream bed, and had no staging under us. After erection I ordered the General Foreman to have the rivets cut out of the joint, that the correct motion might exist, and when it came to this "cut out," the men hung back, and the General Foreman had to go and stand on the chord, while a special gang of foremen cut out the rivets. These men were the best bridging men to be found in America, utterly fearless, thorough masters of the practical part of their business; but when it came to cutting in two their lower chord then all their knowledge and sense rebelled, yet they were thoroughly practical foremen. Not a man of them, but was equal in courage, good sense and practical experience in their line of duty to any roadmaster in the country, and it was their practical observations of certain results following certain acts that told them that death would follow the carrying out of their orders, unless the figures made on a sheet of paper by a gentleman living in St. Louis were worth more than all their experiences. The rivets were cut out, and the chord separated about 1½ in. No one was hurt. The figures made by the gentleman in St. Louis were worth more than all their experience and

common sense observations. So I would suggest to go slowly in discarding the conclusions of these painstaking, heavy, careful-figuring Germans.

As to Mr. Gould's statement that a spike slot in a steel rail weakens the rail value 70 per cent., I will simply say that the statement is not correct, either in theory or in practice. I have too often seen the actual break in a cut rail depart entirely from a carefully cut "score" (all around the rail, and averaging  $\frac{1}{8}$  in. depth) and wander off into the solid uncut body of the rail.

While walking track on main line in early spring of the

Nevertheless, steel rails should not be notched; such notching serves to accentuate to a given point overloading strains, which without the notch the rail might successfully resist. We carry, on the line of which I am an employé, the heaviest rolling-stock in the Northwest, and our rail is only 56 lbs. The thermometer ranges here from 115° in the shade (on three consecutive days) to 45° below zero, yet our angle-bar splices have so far given fair results, although I do not regard them as all that a joint should be.

We do not give the splice a very fair show for its life with our present make of bolt, as it produces very unequal strains.

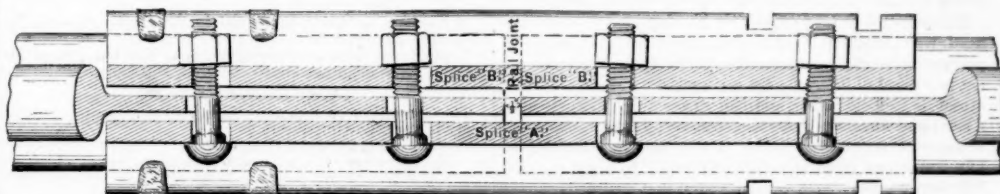


Fig. 1.—Position assumed by track bolts of ordinary form when joint has pulled apart as widely as it can.

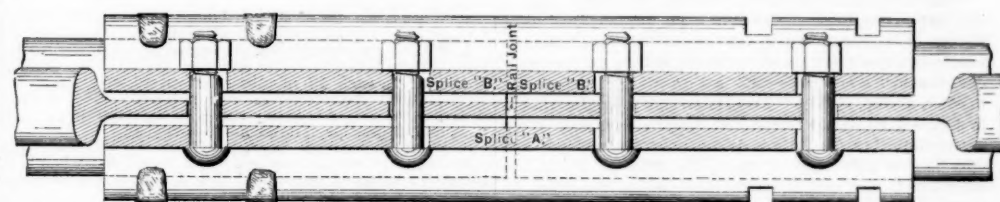


Fig. 2.—Effect of substituting an oval-bodied for a cylindrical bolt, under the conditions assumed for fig. 1.

present year, I found a steel rail with a portion of its outside flange detached, and the detached piece lying under the rail. The piece was 6 in. long, and its depth was so great that a fibre of the web showed on it. The fractured edge was rusty at all points except a space at one end about 1½ in. in length. Examination showed, at the other end, a faint semi-circular indentation, so I knew it had been struck by a spike-maul. Examination of the spike head showed no signs of the maul. Spike and tie and rail had been there, without change, for about seven years. The probabilities are that a miss-stroke was made by the tracklayers. The injury was partly on and partly off the tie, near the middle of the rail. Now the rail was at the foot of a sharp grade, and I had very many perfectly good steel rails broken last winter after our road-bed became thoroughly frozen, and all its elasticity was lost; yet this damaged rail showed no knowledge of its defect. If a  $\frac{1}{2}$ -in. notch reduces a rail 70 per cent. in working value, this rail must have had a value considerably less than zero.

To explain, note in fig. 1 the position assumed by the bolt when the joint has pulled apart as widely as it can, and note in fig. 2 the great improvement effected by an oval bolt which I suggest as a substitute. Our present standard bolt has a value of about 3,500 lbs. against a pull at rail contact. The oval bolt placed in same holes has a value of practically 8,000 lbs. and produces an even pull on both bars.

I inclose to you, herewith, a drawing of a suggested form and section of a heavy rail, and splice bar for same. Let us see what comments their peculiarities and probable qualities may elicit. They are certainly a change from anything in that line now in use.\*

The weight of the suggested rail and splice may seem ex-

\* [This is the old Brunel bridge rail, designed at the beginning of the railroad era for use on the longitudinal sleepers of the Great Western Railway (7 ft. gauge), but also used with cross-ties. The joint also is essentially the same as used for the latter type of rail. Both rail and joint are still in use to a considerable extent, and give perhaps the most perfectly riding track in the world, the joint being almost imperceptible.—EDITOR.]

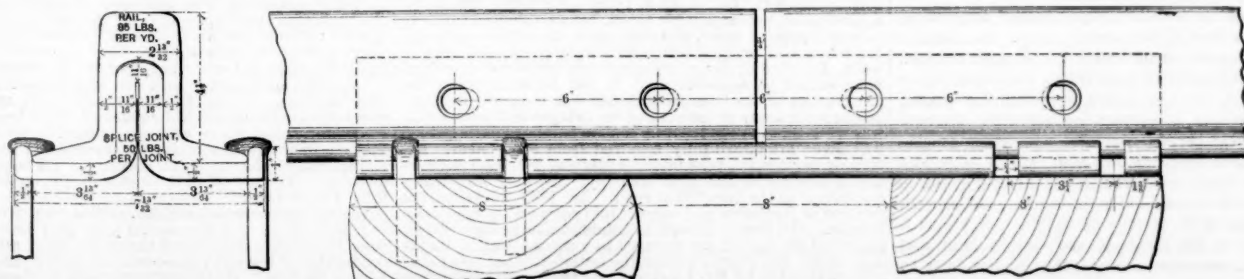


Fig. 3.—Suggested Rail-Section and Splice (Brunel Bridge Type).



cessive, but it is required by the excessive and increasing demands on the track.

I claim to be a practical man myself; at all events, I am neither theorist nor scientist; and having passed 30 years in constant handling of men and work, I may be pardoned for wanting to go slow on joints. C. C. WRENSHALL.

#### Car Seats.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I have read with considerable astonishment a letter signed "Superintendent" in *The National Car-Builders*. Speaking of a paper on car seats recently read by Mr. M. N. Forney at a meeting of the New England Railroad Club, "Superintendent" remarks:

"Instead of furthering railroad interests, this paper on car seats is calculated to exert a most mischievous influence against them. There are things about railroads that the public is far from being satisfied with, but the condition of the ordinary car seat is not one of them; and it seems to me a most reprehensible proceeding, that railroad officers should spend hours abusing car seats and arousing people to be discontented with them without any cause whatever. If any of the men who took part in abusing car seats will travel constantly for a month, I do not believe they will hear two complaints about the seats, unless they happen to meet a couple of cranks with jaundiced views of earth's institutions generally and of railroad institutions in particular, when there will be an abundance of abuse of everything within sight of a car. If car seats were made specially to take care of the angularities of such people's anatomy, nothing could be done to sweeten their dispositions, so the work of trying to make them comfortable would be lost labor. Railroad companies have displayed great solicitude in promoting the comfort of passengers in every way, and no reasonable expense has been spared in doing so; but they cannot be expected to go around to make provisions to meet the caprices of whimsical people who find nothing but misery in conditions where the rest of mankind are comfortable and happy."

It is unnecessary for me to defend Mr. Forney; his services in promoting the best interests of railroads and railroad men speak for themselves, and I will, therefore, pass on to consider the singular views which "Superintendent" entertains as to the manner in which passengers should be treated.

Speaking from a somewhat extended and varied experience of railroads, I venture to say that the line whose policy is dictated in the spirit of "Superintendent's" letter will soon find that its dividends diminish, and that its traffic is appropriated by more enterprising rivals. The best interests of railroads are promoted by a constant endeavor on the part of the officers to effect improvements, and not wait until better methods are forced on the road by outside pressure.

This principle is best proved by the fact that a well managed, well organized road, which endeavors to take every precaution for the comfort and safety of its passengers, cannot be robbed of its traffic by a competitor, which pays less attention to these points, and can successfully compete with a rival line which has a shorter route, better grades, and equal or superior terminal facilities. I need not mention names, but numerous cases in point will occur to your readers. I therefore repeat most emphatically, that railroads cannot afford, ostrich like, to stick their heads in the sand, and say, "Let the rest of the world go on; we don't want none of your improvements."

"Superintendent" makes another huge mistake in supposing that no improvement should be made until expressions of discontent become universal. All successful caterers for the public anticipate their patron's wishes, and do not let things drift into such a miserable state that an outcry is necessary to effect a cure. Does "Superintendent" imagine that a first-class hotel should be run with tougher beefsteaks every day until the boarders in a body interview the manager and offer him the alternative of eating the steak or killing another cow? Yet that is exactly the method on which he seems to imagine a first-class railroad should be run. He says in nearly so many words that no improvement in seats should be made until a majority of the passengers pass most of their time in abusing the ill-devised arrangement on which their wearied bodies vainly seek ease and comfort. "Superintendent" must either be a very unobservant man or the patentee of an extra uncomfortable car seat. Hasn't he yet learnt that people don't always grumble when they are greatly dissatisfied? Late last fall I rode in a parlor car on a fast train. A few chairs away were three ladies rather warmly dressed. The day was unseasonably mild, the heating apparatus was on full blast, and all the doors, windows and ventilators were fast. The heat was stifling, and one of the ladies complained of it and asked a passing brakeman to open a window or ventilator. He cast a hasty glance around and growled a negative. "Well, then, leave the door open." He made no reply, strode off and banged the door to after him. Now, that is exactly the kind of treatment passengers get from men of "Superintendent's" type when they do complain. They are left to roast whether they complain or not, and their only remedy is not to even grumble but travel by another line.

"Superintendent" is so full of wrong-headed impressions that I can only notice a few more of them. He seems to imagine that no improvement should be brought forward until there is a great public demand for it. It is satisfactory to find that in 1886, one man at least is certain that George Stephenson was wrong in introducing railroads at a time when every one was perfectly satisfied with stage coaches and considered that 10½ miles an hour was a marvelous speed at which to travel, and reflected the highest credit on those who drove the horses, built the coaches, and mended the roads. To come down to later times, it is sad to reflect that the inventors of the telephone, the electric light, and even the telegraph were mischievous cranks in presuming to bring out these inventions before an universal grumble called for them.

"Superintendent" says that none but cranks of the deepest dye ever complain of car seats. How is it, then, that every speaker at the meeting of the New England Railroad Club admitted that the present style of car seat is very uncomfortable, and that, with one exception, all agreed that Mr. Forney's seat was extremely comfortable and a great improvement on existing car seats and chairs?

It was no doubt very unpleasant for Rip Van Winkle to discover that the barrel of his gun was rusted solid and the stock rotten, while the young men round him had brand new rifles; but I fear "Superintendent" will be even more shocked to find that a really comfortable and roomy reversible seat can be made as easily as those which now afflict the bodies of weary travelers. "Superintendent" doubtless loves the present style of seat because, as far as comfort is concerned, it hasn't been improved during the last quarter of a century. But I fear he won't find even a dog Schneider to sympathize with him. HELIOS.

#### Master Mechanics' Association Circulars.

The following committee circulars of inquiry have recently been sent out by Secretary J. H. Setchel, from his office in Dunkirk, N. Y.:

##### IMPROVEMENTS IN LOCOMOTIVE BOILERS.

The Committee on Improvement of Locomotive Boiler Construction respectfully request such general information as you can give of the art, and particularly to that of improvements (however minute a nature), and to those of a character that permit a higher steam pressure to be carried, and to first cost and maintenance of the Wootton boiler or boilers of similar or any design, in comparison with those of usual type.

Drawings should be sent, illustrating improvements; and communications as regards the whole or part of the subject under consideration will receive attention.

GEORGE W. STEVENS, } Committee.  
WILLIAM FULLER, }  
T. J. HATSWELL, }

Replies should be addressed not later than April 1, 1886, to G. W. Stevens, Superintendent Motive Power, Lake Shore & Michigan Southern Railway, Cleveland, Ohio.

##### SHOP TOOLS.

The Committee on Shop Tools respectfully ask for the following information:

Please state if you have used milling machines instead of planers for surfacing work. State kind of work surfaced and difference in time in favor of either machine.

It is not necessary to give the number of hours occupied by a machine in performing a certain amount of work. The result if given in form of a percentage in favor of the one or other machine will answer quite as well, the object being to simply ascertain which is the cheaper method, and to what extent.

If you have anything to suggest in the matter I should be pleased to have you do so. D. A. WHITMAN, Chairman.

Replies should be addressed to D. A. Whitman, Superintendent Pittsburgh Locomotive Works, Pittsburgh, Pa.

##### BALANCED SLIDE VALVES.

The Committee on Balanced Slide Valves requests an early reply to the following questions:

1. With what balanced slide valves for locomotives have you had experience? Please send sketch or drawing of same.  
2. Upon how many engines were these valves applied? Give date when the first of each description was placed in service.

3. If you have had experience with more than one kind of balanced slide valves, please state which you consider on the whole the most satisfactory, and name the good and bad features of each valve.

4. What is the cost of these balanced valves and necessary adjuncts, per engine, compared with the ordinary valve?

5. What is the average cost per engine per annum of maintaining these balanced valves and their seats? Give figures applicable to each 12 months after valves were placed in service, until their removal was required; give similar figures in the case of ordinary valves on the same class of engine, and, if possible, mileage made each year.

6. What mileage is represented by 1½ in. wear of valve seats of similar engines, when using, and when not using, the balanced valves, and state if vacuum valves were used in each case on steam chests.

7. What packing strips are used? What width should they be to give best results? Should they and the grooves in valve be fitted by scraping, or will planer and milling machine make a sufficiently good finish?

8. When springs for holding up the packing strips are used, what kind give best results?

9. What increased life of valve gear is obtained by using balanced valves? Does it thereby reduce the cost of engine repairs to any appreciable extent?

Do not confine your answer to the above questions, but please give any information, statistics or opinion you may have on the general subject of balanced slide valves for locomotive use.

CHARLES BLACKWELL, } Committee.  
E. M. ROBERTS, }  
JAMES MEEHAN, }

Replies should be addressed to Mr. Charles Blackwell, Union Pacific Railway, Omaha, Nebraska.

#### The Late Thomas Leighton.

Thomas Leighton died this morning at his residence on East avenue, in the town of Brighton. He had been an invalid, or, at least, in partially broken health, for many years. At one period his condition was regarded as hopeless by his friends, but he recovered from that attack and afterward remarked, cheerfully, when questioned on the subject, that he thought he should outlast many of his old-time friends who had been preparing to attend his funeral. Mr. Leighton was born at Augusta, Me., April 8, 1818. He began life as an apprentice at the carpenter's bench, but soon showed capacity to take charge of work, and early gave his attention to the construction of bridges, which were in those days all built of wood. Impelled by the restless activity which was ingrained in his nature, he made his way to the Isthmus, where the construction of the Panama Railroad was then in progress, and he built many if not most of the bridges on that line. It was while thus engaged that he contracted the malaria, which was never afterward fully removed from his system. Returning northward, he obtained contracts for the construction of bridges on the Erie Railway. He also built many workshops on the line of that road. In 1854 he became a resident of Rochester and entered into partnership with John Fowler. The firm of Fowler & Leighton soon became widely known as the leading one engaged in railroad bridge building. After Mr. Fowler's death the latter's brother was taken into partnership by Mr. Leighton, and that partnership was dissolved when wood gave place to iron as material in the construction of bridges. We believe Mr. Leighton's first iron

bridge works were at Buffalo. He built the shops at East Rochester in 1870, and they were at the time the largest of the kind in the country. Mr. Leighton built the first iron railroad bridge across the Hudson at Albany and the two iron railroad bridges across the Connecticut at Springfield. He built many bridges on the Chicago & Northwestern and the Rock Island railroads. Under a contract obtained by him from Commodore Vanderbilt, he built 128 bridges on the Central-Hudson Railroad. There was a fortune in this contract alone. In this city Mr. Leighton rebuilt the old Central Railroad bridge after its destruction by the flood of 1865. He was the builder of the Vincent place bridge, a structure to which he always pointed with satisfaction. He obtained and filled the contract to supply 11 miles of wrought-iron pipe for the Hemlock Lake water-works conduit. He was one of the contractors in the construction of the Rochester & State Line, now the Rochester & Pittsburgh Railway. It would be impossible, with the space at our disposal, to mention even a tithe of the contracting work in which Mr. Leighton was engaged during his long career as a bridge builder; nor is such an enumeration necessary. The facts we have given will convey a fair idea of the scope of his business in a line wherein no one excelled him. His aim was to build bridges which would stand. He took pride in the character of his work and was never afraid to face it.

Mr. Leighton leased his East Rochester works to Alden & Lassic three years ago, and six weeks ago sold them to Mr. Alden. For some years he had been wholly out of business, not from choice, but by reason of physical disabilities. Mr. Leighton resided for a long period on North Clinton street, but had lived for 11 years at his fine residence on East avenue. His surviving family consists of his wife, one son and one daughter. His son William, who is 20 years of age, had just returned home from Union College; his daughter, whose age is 16 years, is a pupil of the Granger Place school, at Canandaigua. Mr. Leighton was a member of the Masonic order. In former years he was one of the most active members of the old Audubon club.

Thomas Leighton was a big-souled man. In the days of his prime he leaned upon no one, but was always ready to give others a start in life. The only trouble that he ever brought upon himself was trouble caused by his free-hearted and open-handed acts in behalf of people who afterward proved unworthy of the generous help he had given them. His nature was bright, sunny and, we may almost say, confiding; and as there are never wanting persons to take advantage of such a disposition, he was never free from applications for pecuniary assistance. Mr. Leighton was once worth over half a million dollars, and leaves at least a moiety of that sum to his family. Few of the older residents of Rochester were unfamiliar with his cheerful face and his frank and hearty speech. His death is an event which will have an importance to them that in the nature of things it cannot possess for those of a younger generation.—Rochester (N. Y.) Post-Express, Feb. 2.

#### The Glasgow Underground Railway.

Many schemes have been proposed both for elevated and underground railways through the centre of Glasgow, but in 1882 an underground line was decided on, and active operations were commenced in the spring of 1883. Though the population (700,000) is considerably smaller than that of London, the physical aspects of the two cities are very similar. Both are situated on tidal and navigable rivers, the bulk of the population being on the northern and more hilly bank. In both cities the main line termini were situated in the northern, eastern and southern portions of the town, while the western or more fashionable quarter of the city was unprovided with railroad facilities. The Glasgow termini were connected and local traffic accommodated some years ago by railroads partly on brick viaducts and partly in open cuts. The present underground line, by tunnelling under the highest elevations in the city, avoids the necessity of disturbing or buying valuable property, and gives the west end direct communication with the business centre, the east end, and the northern suburbs. The line starts from the College station, the principal east end passenger and freight depot, passes 18 ft. under another large passenger and freight station at Queen street, and running in tunnel 96 ft. under Blythswood Square forms a junction with the Stobcross dock line in the extreme western suburbs. The line is double-track throughout, and is arranged with every modern convenience for heavy traffic, most of the passenger stations having four or more platforms. A portion of the line runs immediately underneath the centre of a street, which had to be opened up bodily, and afterward remade on top of the brick arching. Some house property here had to be taken down. The length of line under the most densely built portion of Glasgow is 2½ miles, of which 1½ miles are in tunnel, the remaining length being in open cutting with massive masonry retaining walls. The grades in the tunnels are 26 ft. per mile and 66 ft. in the cuts. Much of the work was through mixed shifting or running sand and mud in combination with water. Part of the work, however, was through solid freestone, which was used for the masonry. The buildings passed under without purchase had to be shored up and underpinned in two cases only. The semi-circular roof of the tunnel is composed of six rings of brickwork, a covering of concrete being added where the excavation is through running sand or mud. The entire authorized capital of the undertaking is \$3,150,000, including \$893,000 debenture bonds. The North British Railway will work the line, paying the constructing company 2½ cents per passenger and 4 cents per ton of freight, and guaranteeing a minimum dividend of 3 per cent. if the tolls are insufficient to pay that amount.

#### THE SCRAP HEAP.

##### Pathfinders.

"Are we running on time?" said the conductor, repeating the nervous passenger's question. "No, sir; we are not running on time; we are doing a strictly cash business. Fare, please."

"What did you do for a living before railroads were invented?" asked the cross passenger savagely, just because the brakeman stood upon one of his shoulders to light the lamp. "Don't remember, exactly," replied the brakeman, turning down the flame a little, "but I reckon I got along about the same as I will when they get out of use."

"I have no money," said the weary-looking man with thin whiskers. "I am one of those who carry neither purse nor scrip nor yet changes of raiment." "So I see," said the conductor, "and where are you going?" "Young man," said the weary one solemnly, "Heaven is my home." "All right," replied the conductor cheerily, "I'll take you as far as we go. You get off at the first stop, Skyler Junction, and take the Air Line."

The car was crowded, and Mr. Oldtraveler, who was going to "Noo York" for the second time and knew his rights, stood in the aisle and refused to pay his fare, and defied the conductor. "I won't pay a cent," he said, "till I get a seat. I know the law." So the conductor said he should have one, all to himself. And when the train passed on, there he was, sure enough, sitting on a pile of ties on the side of the em-



bankment, with his "carpet-bag" between his feet and seven miles of good walking to the next station. The law was all right, but the conductor hadn't heard of that decision.

"Doesn't it wear out your patience, having to stand so much abuse?" asked the funny passenger. "I don't catch on," the conductor said. "Why," replied the passenger, "iron's cold." "Yes," wearily spoke the conductor, "and steel rails." "And cross ties," murmured the sleepy passenger, half awake. "And so many switches," said the cross passenger. "Ah," said the conductor, sweetly, bending to look reverently at the pass the director's daughter held out, "but we don't mind the company's witches." And the blushes that mantled her cheeks lit up the car with a rosy glow, like a red light in a fog bank.

The head brakeman on second 72 was suffering from malignant malaria, and the fireman was telling him of a homoeopathic physician who could just knock it cold. "Aw, come off," said the sufferer. "Narrow-gauge doctor! None of your sugar-coated 2-billionth trituration pellets for my mother's child. When I want a quinine pill, I want one of these old double-header fellows; gim me a rustler with six drivers that takes right hold of a wet rail and pulls up a grade like a boy goin' to a fire." And he took a six-grain powder dry, and shuddered as it stuck in the roof of his mouth till he couldn't remember whether he was to take three powders at a time, or one powder in three doses.—*Burdette, in Pathfinder Guide for February.*

#### Railroad Relief Associations in Massachusetts.

The Railroad Committee of the Massachusetts Legislature has now under consideration those portions of the Governor's address and the Railroad Commissioners' report relating to railroad relief and pension funds. Judge Russell, from the Railroad Commission, stated to the Committee his belief that by the general adoption of such plans the railroads would gain by getting better and more permanent help. Success has followed the plan of the Baltimore & Ohio. If the road gains the public gets the benefit in safety and efficiency. It would be the beginning of co-operation between capital and labor. He presented drafts of two bills in which he said he had no choice; both would be acceptable.

#### Ticket Forgers.

A despatch from Omaha, Neb., Jan. 29, says: "John L. Gideon, a clerk in the general ticket office of the Burlington & Missouri River road, has been arrested, charged with altering and forging railroad tickets and disposing of them to brokers. It is alleged that Gideon is one of a ring of bogus ticket operators."

#### Studying Human Nature.

"Didn't you sell any peanuts?" inquired the experienced train boy of the new recruit. "No," was the reply. "Go through the car an' give each passenger a peanut." The new recruit did so. "Now try 'em again," said the train boy of experience. Presently the new recruit came after more peanuts. "You want to keep your eyes open in this business, young feller," admonished the expert, refilling the basket. "Anybody'll eat a peanut what don't cost him nothin', and when he once gets the flavor he's gone. You've got to study human nature."—*New York Sun.*

#### The Goat's Night Out.

At 10 o'clock last Sunday night at the 125th street station of the Sixth Avenue elevated road the down train received a passenger of a belligerent turn of mind in shape of a billy goat. The goat's fare was duly paid by his escort, and he stepped aboard with peace and dignity and commended himself to the kind attention of his fellow-passengers by a mildness of demeanor, which was as beautiful as it was unnatural. No sooner had the train started, however, than the goat began to exhibit symptoms of war. He first rose up on his hind legs and issued a general challenge to everybody on the car, and on being remonstrated with by the mild old lady who owned him, promptly butted her into a state of helplessness and hysterics.

By this time he had fairly warmed up to work, and took the bold stand that it was his night out and he was going to run things. The door opened to admit the brakeman's announcement of the next station, and he jammed it shut with a ferocity that knocked the brakeman half way into the next car. Then he considered it his duty to simultaneously climb over one timid old gentleman who was endeavoring to soothe the prostrate lady, and begin a vigorous assault and battery on another who was desperately trying to throw himself out of the window. Having knocked these out in one time and two motions, he amused himself by slugging four terrified citizens in the central seats, and then bethought him that it would be funny to make an onslaught on a fat woman who cowered at the other end of the car.

Having reduced her to a satisfactory state of insensibility he began a two-legged war dance before his own reflection in the windows, and entertained himself by pulverizing the imaginary goats he saw therein one by one, until the train came to a stop. Brakemen entered both ends of the car, accompanied by fresh passengers, and were neatly fired out again in tumultuous heaps, setting themselves up like nine pins only to go down again. Meantime the train passed the fat woman's station and the place where the old gentleman desired to get off, but the goat had made up his mind that this was a through car, and couldn't think of allowing way traffic, and so continued to butt brakemen, smash glass and terrify the ladies, until the train reached 53d street, when the engineer, who thought by the constant rattle and crash that a car was derailed, providentially came to a permanent halt.

Then a council of war was held and a strong force of ticket takers, station agents, and police, armed to the teeth and desperate, made a concerted rush into the car and succeeded, after a terrific struggle, in getting the goat down and ending the reign of terror. At first it was thought that a relay of ambulances from Bellevue would be necessary, but the passengers recovered from their swoon and limped out for arnica and an up-town car. The goat was led to durance vile, and the Superintendent of the road considered that the best way of compensating for the damage done the car, which looked as though it had been in a collision, was to fire the man who sold the goat's ticket, the man who took the ticket, and the brakeman who let the goat on. This was rapidly done, and peace once more swayed travel on the Sixth Avenue line.—*New York Times.*

#### Pass Swindlers.

The *Pathfinder Railroad Guide* says that circulars asking for annual passes have been issued this year as usual by the Massachusetts & New Hampshire R. R. & Steamboat Co., and the Northern R. R. & Steamboat Co., care being taken in those circulars not to explain that the "R. R." in their titles stand for "River Rafting" and not for "Railroad." Neither company owns a mile of railroad. The *Pathfinder* comments upon these circulars as follows:

"The river-rafting swindle has become an antiquated chestnut, and the steel lines without an inch of track, first exposed by the *Pathfinder* in 1882, are soliciting an exchange of annual passes for the current year, as shown by their circular requests.

"The only change we discover is in the location of the gen-

eral office of the 'Northern R. R. & Steamboat Co.,' which has been moved from Lowell, Mass., to Nashua, N. H., while the officers (?), all residents of Lowell, remain the same as last year. A general passenger agent in Charleston, S. C., sending us one of the above circulars—think of a river-rafting company, whose legitimate business would take a 'traveling agent' to South Carolina—writes as follows: 'Will not the leading railroad publications do something toward demolishing such frauds as the inclosed?' Another general passenger agent sends us a design for a river-rafting letter-head, showing the manager and traveling agent on the deck of a raft of logs, which glides gently down the stream, under the shadows of the umbrageous oaks of Tyng's Island.

"This annual game has ceased to be funny. Railroad officials are disgusted with it, and we ask the men whose names are given in the above circulars to inform the public through the columns of the *Pathfinder* of the use they made of the few passes they got last year.

"If there is no law to prevent such men from obtaining property from transportation lines under false pretenses, there ought to be. Will the Middlesex district attorney please note these cases?"

### TECHNICAL.

#### Locomotive Building.

The Union Pacific Railway's mechanical department recently turned out at the shops at Omaha a new passenger locomotive, with cylinders 18 by 24 in., and driving wheel centres 63½ in. The total weight of the engine in working order is 93,000 pounds, of which 59,000 pounds are on the drivers. The boiler is of best charcoal iron, and the horizontal seams are double riveted with welt. It is of the wagon top style, and is 56 in. diameter at the smallest ring. A single dome is used, which is placed above the fire-box, and is 27 in. high by 28 in. diameter. There are 201 tubes 2 in. by 12 ft. 6 in. The fire-box is steel, and is 34 in. wide and 72 in. long, and has the crown supported by bars and slings. The boiler carries 160 pounds of steam, and has two Richardson safety valves. The cylinders are reversible and interchangeable, and have steam chest ports 16 by 1½ in., the exhaust port being 2½ in. wide. They are oiled by Nathan sight-feed lubricators. This has been the standard heavy passenger engine of the road, and is well spoken of for efficiency. Mr. Clement Hackney is, we understand, effecting some improvements on the engine. Seventeen new engines of this kind are, we understand, about to be ordered made by one of the contract shops.—*National Car-Builders.*

#### The Car Shops.

The Knoxville Car Wheel Co. has recently received an order for 2,100 pairs of wheels on axles for the Savannah, Florida & Western road. The company has several other contracts on hand, and will increase the capacity of its works to 1,000 a day.

The Gilbert Car Works in Troy, N. Y., have just completed a very handsome sleeping car for the Monarch Parlor & Sleeping Car Co. of New York. The car is intended to run between Chicago and New Orleans, and has sleeping accommodations for 40 persons.

The Carl's Car Works, in Carlisle, Pa., are building a number of stock cars of an improved pattern. The Beaver Falls Car Co., in Beaver Falls, Pa., whose buildings were recently destroyed by fire, have succeeded in renting an unused machine shop and foundry in the same place, and will shortly have a considerable force at work.

#### Bridge Notes.

The Pittsburgh Bridge Co. in Pittsburgh has orders enough on hand to employ the works for several months. An order was recently taken for an iron draw-bridge for Chicago.

The Laconia Car Co. in Laconia, N. H., has received an order for 350 box cars for the Boston & Maine road.

#### Iron and Steel.

The York Rolling Mill at York, Pa., is to be enlarged to accommodate increasing business. Woodstock Furnace at Anniston, Ala., has gone into blast, having received thorough repairs.

The furnace of the La Grande Iron Co. at Danville, Tenn., has gone out of blast for repairs, but will be ready to start up again in April.

The Chicago Forge & Bolt Co. is running its work double turn on some large orders for car axles. Foundations are being laid for a new forge building 125 by 420 ft., to contain several new hammers, and also for a new rolling mill and bolt works 500 by 420 ft. in size.

#### Manufacturing and Business.

Mr. Frederick H. Lewis, recently Resident Engineer on the South Pennsylvania Railroad and formerly Inspector of Bridges on the Northern Pacific, has opened an office at 181 South Fourth street, Philadelphia, and offers his services as inspector of bridges, steel rails, boiler plates and all varieties of iron and steel. Mr. Lewis will also place orders for railroad materials and iron and steel work of all descriptions.

The Colliary Furnace Co., of Detroit, recently received an order for 2 Colliary cupolas of the largest sizes for the Reading Foundry Co. in Reading, Pa.

The Cummer Engine Co., of Cleveland, O., has recently taken orders for a large number of stationary engines, including two to go to Cuba and one to Texas.

#### The Rail Market.

Steel Rails.—Few sales are reported, but quotations are steady at \$34-\$35 per ton at mill for ordinary sections. Not much demand is reported for light rails.

Rail Fastenings.—Trade is improving and quotations are steady at 2.25 cents per pound for spikes in Pittsburgh; 2.75 at 2.90 for track-bolts, and 1.70 at 1.75 for splice-bars.

Old Rails.—The market for old rails is unsettled, with quotations at \$22-\$23 per ton at tidewater. Old steel rails are quoted at \$22-\$23.50 per ton in Pittsburgh, with light supply.

#### Some New Locomotives.

The Illinois Central shops have built 12 new engines during the past year, including four American type engines and four Moguls, particulars of which are given below:

	American.	Mogul.
Cylinders.....	17 x 24	18 x 24
Drivers, diameter.....	60 in.	56 in.
Weight in working order.....	lbs.	lbs.
Truck.....	28,000	18,000
Drivers.....	56,000	68,000
Total.....	84,000	86,000
Tender empty.....	28,800	28,800
Water.....	25,000	25,000
Coal.....	12,000	12,000
Total.....	63,800	63,800
Engine and tender.....	147,800	149,800

The tenders and the boilers (of the wagon top type) are precisely similar for both classes. The barrel of the boiler is made of ¾ in. steel, the front and back flue sheets being ½ in. There are 175 flues 2 in. diameter. The fire-box is 72 in. by 35 in. inside. All axles are of steel, the driving journals being 7 in. diameter by 7½ in. long.

#### Testing Capacity of Locomotives.

An exchange states that on a certain road it was believed that the engineers were combining to pull fewer cars than the locomotives ought to have taken along, and accordingly the officers of the road determined to test the matter for themselves. One fine morning the Master Mechanic took engine 75 and hitched on to a train of 45 cars with the Superintendent acting as conductor. They stalled with the train and had to double, so the conclusion arrived at was, that the modern car loaded with 20 tons is not so easily hauled as the cars were in the days when 10 tons or under constituted a load.

#### Track-Tanks on the New York Central.

The Buffalo Courier states that the New York Central is about to lay down water troughs, or track-tanks, just west of Palatine Bridge, in order that fast freights can pick up water without stopping. The system has long been used by passenger engines on the Pennsylvania and New York Central, and presents many advantages. It is stated that the new troughs are to be of cast iron, instead of wrought iron or timber as usual.

#### Pittsburgh Bessemer Plants.

In a short time six Bessemer steel works will be in operation in the immediate vicinity of Pittsburgh. The Edgar Thomson and the Pittsburgh Bessemer are well known. The Pittsburgh Steel Casting Co. has also had a Bessemer plant for some years. The Clapp-Griffiths plant is also a Bessemer works. The Shoenberger plant is nearly ready for operation, and soon this firm that has so long been connected with the iron industries of Western Pennsylvania, will cease to manufacture iron except in its blast furnaces, and will become steel manufacturers, having both a Bessemer and an open-hearth plant. Jones & Laughlin's new Bessemer plant is also being pushed forward, and the spring will probably find it in operation. The interesting point about these works is that only one of them, the Edgar Thomson, is a manufacturer of steel rails. The Pittsburgh Bessemer is prepared to make rails, should it be deemed best, but its entire production is in demand for merchant steel, chiefly in the shape of blooms, slabs, etc., for re-working in other steel and iron works. The Pittsburgh Steel Casting Co.'s make has been sold in a similar shape. Probably some proportion of the production of Jones & Laughlin and Shoenberger & Co. will also be put on the market as blooms, billets or slabs, but at one works at least a large percentage will be rolled into various forms at the works.—*American Manufacturer.*

#### The Sand Blast on a Locomotive.

A letter in *Engineering* states that some singular experiments are now being made with a passenger locomotive on the Midland Railway (England). This engine, No. 1,309, has inside cylinders 17½ in. by 26 in. and four coupled wheels 6 ft. 6 in. in diameter. The coupling-rods have been taken off, sand-boxes are placed in the smoke-box, and the sand is applied to the rails and wheels by a sand-blast worked by compressed air from the main reservoir of the Westinghouse brake; the results appear to be highly satisfactory.

The Carlisle section, on which the engine is running, has grades of 53 ft. to the mile 15 miles long, and the trains are equal to from 6 to 9 Pullman cars, and are run at a high speed, 86½ miles being run in one hour 55 minutes without a stop. It seems doubtful, however, whether the extra friction and wear caused by the sand will not offset the smaller friction and cost of a single compared with a coupled engine.

#### Casting Wrought Iron.

The following interesting account of this new process is somewhat condensed from an article in the *Providence Journal*:

A Swedish invention for casting wrought iron is now in practical operation at the Worcester Malleable Iron Works. The furnace is of wrought iron, about 5 ft. long, 2 ft. high and 3 ft. wide, and is divided into three compartments, each holding two crucibles. At one end of the furnace are three V-shaped troughs, about 3 in. deep. Crude petroleum is fed into these troughs, and the flame is turned into the furnace by the draught of a chimney. It then passes down a narrow chamber constructed of firebrick, and enters the first crucible compartment through an opening near the bottom, uniting at the same time with a stream of air from an atmospheric conduit in the bottom of the furnace. The flame is most intense, and completely envelops the crucibles. From this first compartment it emerges at the top on the second side, and enters the second compartment, surrounds the crucibles there, and passes through an opening at the bottom of the third compartment, and after passing round the crucibles there, the flame passes out near the top into the chimney. The first set of crucibles are thus subjected to the severest heat. The position of each crucible is changed after each pouring, being shifted in succession from the coolest to the hottest position. The intensity of the flame is regulated by varying the size of the orifice which admits the air. The crucibles remain in the furnace two or three hours. When poured the molten iron is treated as an ordinary casting, but appears more liquid, and runs like water, giving remarkably sharp and solid castings.

The castings when cool can be hammered, welded, elongated and filed with as much ease as good bar iron. The metal is said to be from 20 to 25 per cent. stronger than ordinary wrought iron. It is stated that Mr. Nordenfeldt, the well-known inventor of the machine gun of that name, Sir Henry Bessemer, and Mr. E. A. Cowper, a well-known English mechanical engineer, have all given considerable attention to this invention, and have expressed themselves as satisfied with its genuine and important character.

#### Switch Patent Litigation.

A dispatch from Springfield, Ill., Jan. 26, says: "In the patent suit of A. B. Stone et al. against the Elliot Frog & Switch Co. the motion made by complainants to set aside the decree entered in favor of the defendant was overruled today by Judge Treat in the United States Court. The suit was brought for the alleged infringement of a patent on a railroad switch issued to Clarke, Jefferys & Stewart in 1874, and was decided in favor of the defendant about three weeks ago, and this motion, which was overruled, was made by the complainants to have the decree set aside and for a rehearing."

#### Soda Steam Engine Motors for Chicago.

The soda steam engine motor invented by Mr. Moritz Honigman, of Germany, a full description of which appeared in our issue of July 3, 1885, has recently been introduced in Chicago, two of them having been imported from Germany for trial by the Chicago Passenger Railway Co. The motors are similar in appearance to ordinary street cars, except that they have no platforms. They are 11 ft. long and 7 wide, and the motive power is derived from a supply of caustic soda, which is heated in boilers at the terminus of the line and forced into the boiler of the motor. No fire is used on the motor. It can be stopped almost within its own length when running at full speed, which is about 10 miles an hour. The present motors cost \$2,000 to \$2,500 and will draw two loaded street cars. They will, it is claimed, also furnish hot air to heat the cars. The test has been successful enough to satisfy the company that the experiment is a very promising one.





Published Every Friday.

## EDITORIAL ANNOUNCEMENTS.

**Passes.**—All persons connected with this paper are forbidden to ask for passes under any circumstances, and we will be thankful to have any act of the kind reported to this office.

**Contributions.**—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies; the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and in their management, particulars as to the business of railroads, and suggestions as to its improvement. Discussions of subjects pertaining to ALL DEPARTMENTS of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.

**Advertisements.**—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our editorial columns OUR OWN opinions, and those only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.

## EXPORTS, IMPORTS AND RAILROAD TRAFFIC.

The exports and imports of the United States are reported by the Bureau of Statistics for December and the year for six successive years. The values of the merchandise exports and imports for the entire year have been, in millions of dollars:

	1880.	1881.	1882.	1883.	1884.	1885.
Exports.....	889.7	833.5	708.0	795.2	749.4	688.8
Imports.....	696.8	670.2	752.9	687.1	629.3	587.5

Excess of exports.... 192.9 163.3 15.1 108.1 120.1 101.3  
Both exports and imports were less last year than in any other of the six, but the excess of exports over imports remains large, though less than in any other year of the six except 1882. The exports were largest in 1880; the imports in 1882. The exports last year were \$201,000,000 (22½ per cent.) less than in 1880, and the imports \$165,000,000 (23 per cent.) less than in 1882.

The decline in exports last year was much greater in the last than in the first half of the year. In the first half they were but \$7,200,000 less than in 1884, in the last half they were \$53,300,000 less. On the other hand, while there was a decrease of \$51,725,000 in the imports in the first half of the year, there was an increase of \$10,000,000 in the last half.

The exports and imports for each half-year are shown below, in millions of dollars:

1st half:	1880.	1881.	1882.	1883.	1884.	1885.
Exports.....	412.7	425.4	342.4	398.2	343.5	336.3
Imports.....	381.5	327.4	381.8	352.1	332.8	281.0
Excess exp.....	31.2	98.0	60.6	46.1	10.7	55.3
Excess imp.....	.....	.....	39.4	.....	.....	.....
2d half:	1880.	1881.	1882.	1883.	1884.	1885.
Exports.....	477.0	408.1	425.6	397.0	405.8	352.5
Imports.....	315.3	342.8	371.0	335.0	296.5	306.5
Excess exp.....	161.7	65.3	54.6	62.0	109.3	46.0

The first half of 1885 showed a larger surplus of exports over imports than any corresponding half-year except 1881, due chiefly to reduced imports, exports being slightly less than in 1884 and 1882, and much less than in the other years. But in the last half of the year the excess of exports was the smallest for the six years (and for at least two years previously), the exports being much smaller than in any other year, and the imports larger than in 1884.

The prosperous times of 1879 and following years were preceded and accompanied by a great surplus of exports over imports. For 14 years, from 1860 to 1873 inclusive, there was but one year in which our imports did not exceed our exports, and in most cases the excess was large, after 1863, varying from 43 to 182 millions. This was suddenly checked in 1874 by a simultaneous increase in exports and decrease in imports, and for a time imports continued to decrease after exports had largely increased. The course of the merchandise exports and imports after the war till 1881 is shown below, in millions of dollars, the years here being the fiscal

years ending June 30, instead of the calendar years given above:

Year to June 30.	Ex. ports.	Im. ports.	Excess.	Year to June 30.	Ex. ports.	Im. ports.	Excess.
1866..	348.9	434.8	Imp. 85.9	1874..	586.3	567.4	Exp. 18.9
1867..	297.3	395.8	Imp. 98.5	1875..	513.4	533.0	Imp. 19.6
1868..	281.9	357.4	Imp. 75.5	1876..	540.4	460.8	Exp. 79.6
1869..	286.1	417.5	Imp. 131.4	1877..	602.5	451.3	Exp. 151.2
1870..	362.8	436.0	Imp. 73.2	1878..	691.9	437.1	Exp. 254.8
1871..	442.8	520.2	Imp. 77.4	1879..	710.4	445.8	Exp. 264.6
1872..	444.2	626.6	Imp. 182.4	1880..	835.8	667.9	Exp. 167.9
1873..	522.5	642.1	Imp. 119.6	1881..	902.4	642.7	Exp. 259.7

It was not till the last half of 1879 that it was generally felt that the country was prosperous; but our exports had increased every year after 1874-75, and had increased enormously after 1875-76, while the imports had been much smaller than in 1873, '74 and '75, so that for the two years preceding the date when it was felt that the country was prosperous, that is, for the two years ending with June, 1879, the excess of exports over imports was not only immensely greater than it had been in all the years previous of that generation, but nearly as great as for the next four years, and greater than the aggregate excess for the last five calendar years.

Doubtless the smallness of the imports at this time was due to the fact that the country did not feel prosperous or confident. It did not buy because it felt poor. Its savings probably went largely to liquidate foreign debts, or, what is equivalent, to the acquisition of American securities held abroad; but this economy before June, 1879, doubtless had much to do with the prosperity for the next few years. We had already adjusted our national industries so as to produce a vast surplus of goods which the world wanted to buy of us, though this was before we began our railroad extensions on a large scale; for the production from which our maximum exports were made (890 millions in the calendar year 1880), was of country which the railroads existing in the summer of 1879 had already made accessible, and then we had about 24,000 miles, against 121,000 in 1883, and 128,000 now. Thus our vast railroad extensions of the last six years—more than 40,000 miles, and an addition of 46 per cent.—have not resulted in any growth of our export trade, and have not presented a serious decline in it. Counting the mileage at the beginning of the year, there were \$10,300 of exports per mile of railroad in 1880, and \$5,500 in 1885.

We have frequently shown heretofore that the increase in agricultural industries since 1880 has been quite moderate—nothing like as large in proportion as the increase in railroad mileage, but the traffic seems to have kept up fully with the mileage. From 1880 to 1884, while the mileage of railroads reporting increased 38½ per cent., their gross earnings increased 32½ per cent. (but their net earnings less than 18 per cent.). Their traffic meanwhile increased from 6,189 millions to 8,779 millions of passenger miles, and from 32,349 millions to 44,725 millions of ton-miles—42 and 38 per cent. respectively.

Thus there can be no doubt that there has been an immense development of traffic of some kind in this period, and as the exports have decreased, and the agricultural production but moderately increased, we are forced to the conclusion that there has been an enormous development of the other national industries.

Doubtless some of the increase in the traffic has been due to the diversion of freight from water routes by low rates, and some also to the development of the Far West, the traffic of which is carried immense distances, like the cattle of Montana and Colorado and the wheat of Dakota, and many of the goods that supply the country west of the Missouri, likewise to the carriage of coal for distances heretofore unheard of. But allowing for all this, there must have been an enormous increase in domestic industries other than agriculture.

This is also indicated by the failure of the imports to increase with the population, though there are many things to affect these.

Per inhabitant the imports were:

1860-70—\$11.00.
1872-73—\$15.70 (the total imports then being the largest known until 1879-80).
1877-78—\$0.40 (the total being the smallest there has been since 1869-70).
1881—\$13.90.
1882—\$14.00 (the total being larger than before or since).
1885—\$10.05.

If our consumption was wholly what we eat and wear, or objects of "unproductive consumption," we should certainly conclude from this either that we are economizing severely in our living expenses, or that we are producing at home what we require much more than formerly. A very considerable part of the imports at times, however, consist of materials for construction—something used in appliances, more or less permanent, intended to increase production; and the imports of these vary greatly—as rails, of which we imported 290,140 tons in 1881 and 5,538 in

1885. In 1880 our total imports of iron and steel amounted to \$80,000,000; in 1885 to about \$31,000,000. In rails there was a decrease in consumption much greater than the decrease in imports; but the iron industry is an example of one of the developments of the last few years, for it is now apparently prepared to produce as much as our greatest yearly consumption, except in some specialties.

We may not then absolutely conclude that the decline of 28 per cent. since 1882 in the value of imports per inhabitant is wholly due to a larger home production. On the other hand, there is reason to believe that part of it is due to a reduced consumption of some things, as certainly of rails, and it is also partly due to a cause not heretofore mentioned, which also reduced export values—namely, lower prices; but it remains evident that the country is supplying its own needs to a greater extent than heretofore, and that the growth of the traffic of the country has been due chiefly to an increase of hundreds of industries of which we have few definite statistics; and that the railroads depend very much less than heretofore on the movement of a few great staples, like grain, provisions, cotton, and the export and import trade. This growth of other industries in itself tends to reduce our exports, because we require for our own consumption a much larger part of our production. We have become a manufacturing country with great rapidity, and traffic is much more complex than it was not many years ago, and the course of it is more difficult to trace or to foresee. This industrial development has come suddenly, and doubtless has been pushed too far in some directions, but it is by no means certain that there will not be hereafter great developments in other directions, though few are likely to grow fast long, because production soon catches up with the national consumption when the progress is rapid, and we are not able to export manufactures. The tendency seems to be a kind of see-saw—first agriculture making progress and yielding a large surplus for export, and then manufactures of some kinds growing much faster than agriculture ever does until the home market is overstocked. When there is industrial stagnation until the farm population and production have increased again and afford large exports. The extension of farming is discouraged somewhat now because of the unprofitably low price of wheat, while the greater part of the fertile government land remaining is chiefly valuable for wheat; and the extension of agriculture will soon be limited by the occupation of territory which not long ago seemed to be illimitable. Not that we may not immensely increase our production of grain, etc., but that we shall not be able to do it in the old way, by plowing up wild prairie land on the frontier. The increase will have to come largely by better cultivation and the improvement of inferior lands, or those which require considerable expenditures before they will produce. That is, as the scientific agriculturist say, "intensive" will take the place of "extensive" culture. But in this we shall not have our old advantage (very cheap land) over Europe; the development may be quite as much in the old as in the new states—will be greater, probably, in Ohio than in Kansas—and will extend over the larger part of the country, causing a more even growth than we have had heretofore; and this will continue and tend to increase what we now note, a much more rapid growth of local and internal than of through and foreign commerce. This will admit of many long hauls, which are always likely to exist in a large country, where industries have developed as they have here, enjoying railroad transportation from the first; but there will be a larger proportion of the traffic carried between interior western and interior southern and eastern points, between Kansas City and Memphis, Pittsburgh and Minneapolis, Houston and Indianapolis, Atlanta and Chicago, and a smaller proportion from the great Western markets to the Eastern seaboard cities.

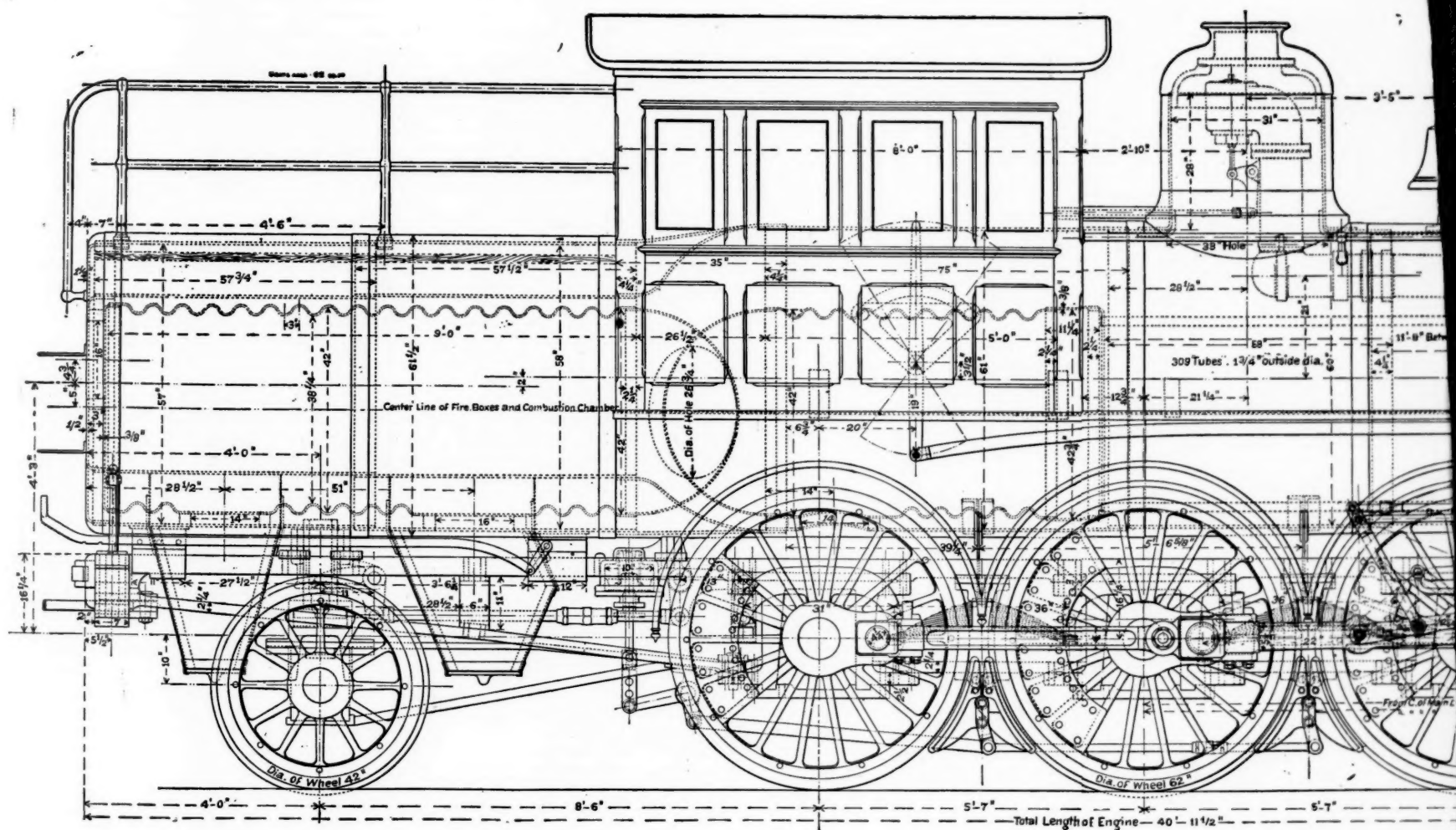
## The Use of Steel on Locomotives.

The last meeting of the New England Railroad Club was devoted to the discussion of a very important and interesting subject, "The Use of Steel and Iron in the Construction of Locomotives."

The general opinion of those who took part in the discussion seemed to be that steel was an unsuitable material for axles, piston-rods and other parts which are subjected to a frequent reversal of strains. It was freely admitted that steel is a more suitable material than iron for boilers, fire-boxes and other parts on which the strain is comparatively steady.

The opinions expressed as to the unfitness of steel as a material for axles will occasion some surprise not unmingled with amusement among those who have

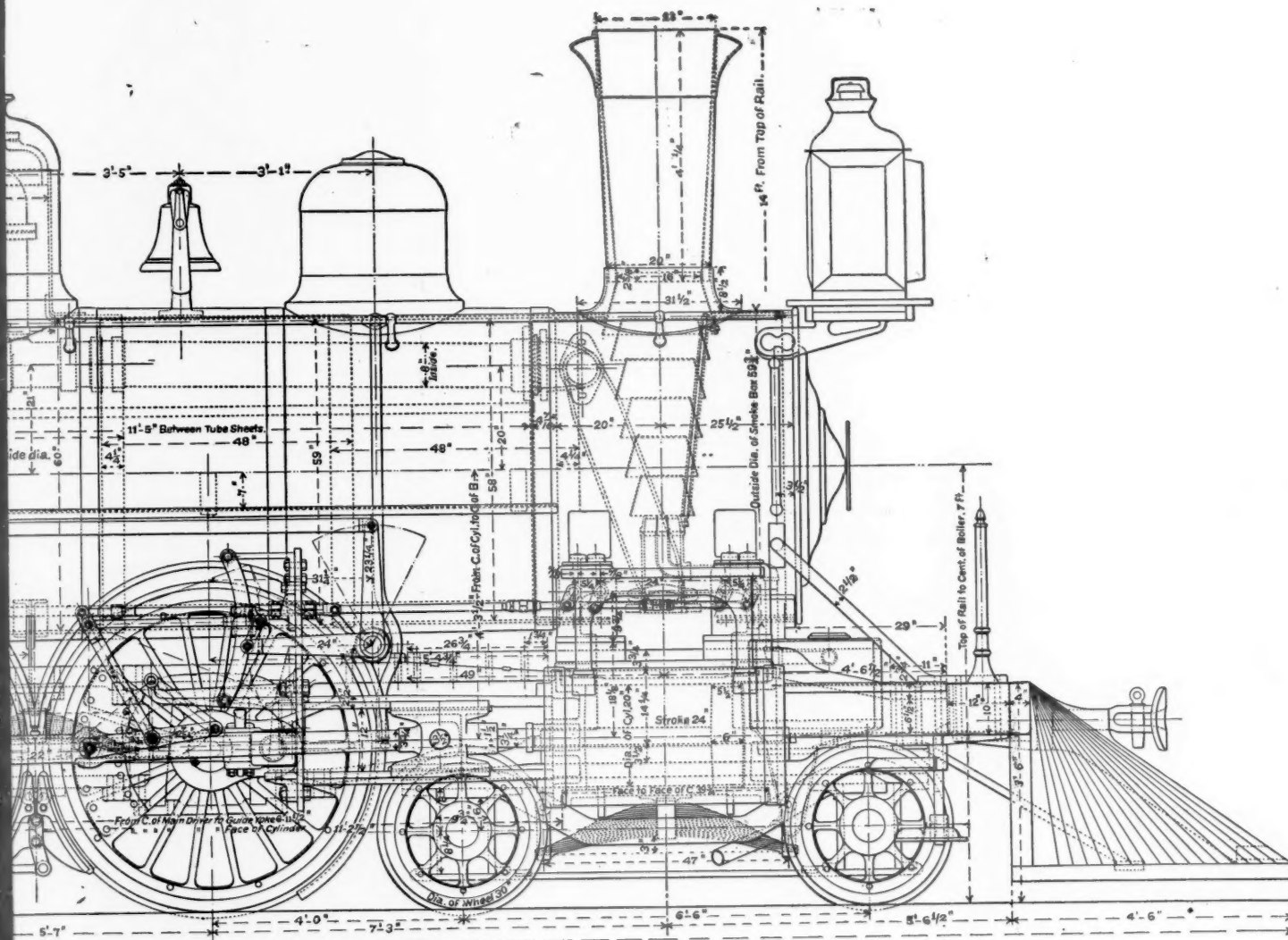




EXPRESS LOCOMOTIVE.

Designed by MR. GEORGE S. STRONG, Philadelphia.

(For description see page 88.)



MOTIVE.

STRONG, Philadelphia.

(page 88.)



used steel axles with great success for many years past. Many single railroads have now running a greater number of steel axles than can be found on all the New England roads put together.

One at least of the speakers at the New England Railroad Club appeared to feel that his disbelief in steel rested on a somewhat small foundation, and said that the Pennsylvania Railroad had just ordered a large number of steel axles, an admission well enough as far as it goes, but which certainly might have gone a long way further without indicating the full extent of the use of steel.

The experts on this line are known to devote great care and skill to such matters, and, being able to conduct their tests on a large scale, their judgment naturally carries great weight. A road which has several thousand engine axles, crank-pins and other parts in service possesses records which are uninfluenced by any accidental or exceptional results, and, therefore, may fairly be assumed to give a fair average of what is obtained and what is obtainable in actual practice. A large corporation can also afford to make expensive experiments that are beyond the means of a small road. And on this question the larger experience of the large roads contradicts the testimony of the New England roads. Those lines that have used steel axles on a large scale seem to have found it answer. The Philadelphia & Reading has, we believe, used steel axles extensively, and has never had one single failure. Mr. G. W. Stevens, of the Lake Shore & Michigan Southern, said in the discussion that he found steel piston-rods did well, and that the piston-rod shown at the meeting probably broke because the steel was of very bad quality, and the rod itself was badly proportioned.

The whole solution of the matter may be found in Mr. Stevens' criticism. Steel used with proper care is an admirable material for axles, crank-pin, coupling-rods, piston-rods and other parts exposed to strains which are constantly varying in direction and intensity. Three leading, not to speak of many minor, conditions must, however, be carefully observed, if failure is to be avoided:

1. The steel must be of good quality when it is first cast from the crucible, or the Siemens-Martin or Bessemer converter, and it should be borne in mind that good quality and freedom from deleterious ingredients, such as phosphorus, is better secured by the original use of good material than by any subsequent manipulation of one or other of the many methods of making steel.

2. The steel should be well worked in the process of forging or rolling. A light plant, when used in making iron, generally yields a mixture of burnt iron and bad welds, which runs a very short mileage. When steel is made with similarly unsuitable appliances, the results are practically the same, though the final failure takes place sooner, and is more sudden and complete.

3. The finished piece of steel, as used in the machine, must be properly proportioned. As far as possible it should be so shaped that the strains in every part are approximately equal. There should be no one weak point at which the strain greatly exceeds that at any other point. A "nick" of any kind is fatal to steel, and in this respect it has been compared to both glass and rubber. A heavy pane of glass will stand a considerable steady load, but a scratch from a diamond which barely grazes the surface will cause an instant fracture. A nick in a sheet of rubber will soon stretch right across it. And similarly a comparative scratch will cause the ultimate fracture of a steel axle. In fact pieces of fine steel of considerable size have been scratched precisely as a pane of glass is scratched with a diamond, and shown to be enormously reduced in strength.

It is, however, perfectly possible to avoid anything resembling a nick or a sudden change of section in an axle or crank-pin. The internal angles of shoulders can, in nearly all cases, be rounded off with a good fillet, and unless this can be done, the use of steel simply invites failure. Piston-rods are generally shouldered down where they enter the cross-head, and the section is further diminished by a keyway cut through the tapered portion of the rod. Taking an actual and not uncommon case in which this method of construction was adopted, we find that the plain part of the rod had an area in cross section of 7 square inches, while the minimum net section through the keyway was only 2.8 square inches. In everyday work, the rod might be called upon to stand a tensile strain of 42,000 lbs. suddenly applied several times in a second, and water in the cylinder would not infrequently considerably increase this figure. The working strain per square inch on the plain part of the rod was thus 6,000 lbs., against 15,000 lbs. on the tapered part of the rod weakened

by the keyway. It is hardly necessary to point out that 15,000 lbs. to the square inch is not a safe strain for any important part of a fast-working machine. Even good crucible steel with a breaking strength of 100,000 lbs. will succumb to a few hundred thousand repetitions of a suddenly applied load of one-sixth that amount when that strain is concentrated at one point.

The piston-rods in question broke, one after the other, after running a few months, although they were made of excellent crucible steel. New rods enlarged where they entered the cross-head were substituted, and have been running successfully for many years on some sixty engines of this class.

Some surprise was expressed at the meeting of the New England Club that the specimens of broken piston-rods, etc., showed that fracture had not occurred exactly at the apparently weakest spot, or point of least section. None of the fractures were, however, very far off. At first sight it might seem to show that the existence of weak spots and sudden changes of section is not the real cause of these fractures. That this hasty assumption is erroneous may be proved by several different methods. In the first place, the fracture can be altogether prevented by strengthening the weak spots, and by abolishing square-cornered shoulders or other sudden changes of section. This has been done in innumerable cases all the world over, and as the strains are the same and the material is the same, the only change being in the design, the alteration in form has evidently effected the cure.

Another reason is that statistics on a large scale show that structures under constantly repeated strains do not always or even in the majority of cases, break exactly through the weak spot. The fracture is generally a little distance away. In an interesting paper read several years ago before the Institution of Civil Engineers, the author showed that a method prevalent in Europe of securing tires to the body of the wheel by means of a rivet through the tread of the tire was dangerous. Tires weakened by this rivet-hole broke far more frequently than plain tires. But, strangely enough, in six cases out of ten, the tires broke through the solid part of the tire and not through the rivet hole. The author of the paper gives his reasons for this apparently erratic behavior of several hundred tires, and we only regret that his chain of reasoning is too long to reproduce here. We may, however, derive two important practical lessons from the facts which he collected. Weak spots will cause the failure of a tire or axle, though the fracture may not take place exactly through the weak spot, and conversely the fact that a fracture takes place near and not through a key way or other weak spot, should not blind us to the fact that the key way did the mischief.

Sudden reductions of area should be avoided in structures made of wrought iron and subjected to a tolerably steady load. The question, however, becomes of vital importance when steel is used in a locomotive, the working parts of which are specially subjected to an enormous number of repetitions of suddenly applied loads from different directions. The great importance and influence of a great number of repeated applications of a load has long been presented practically to those in charge of locomotives, though the exact significance of the breakage of working parts has been somewhat obscured by the tendency to regard the crystallization of wrought iron as a thing which, like old age, is inevitable, if life lasts long enough. A steel is crystalline to start with, some other explanation must be sought when a steel axle fails. Experimentalists and scientists long ago discovered that a bar of iron or steel could be broken in a comparatively short time by the repeated application of a moderate load.

More recently leading bridge engineers have specially recognized this fact, and the views on this point of one of their number, Mr. Benjamin Baker, were recently set forth in considerable detail in our columns.\* Mr. Baker stated with great emphasis that to insure long life to a steel bar taxed by repeated applications of a load, it is absolutely necessary that the working strain should be considerably smaller than is usually considered permissible with a steady load.

The safe load which a structure will bear depends not only on the proportion which the safe load bears to the breaking load, but on the number of times the load is applied and released. A breast-summer that will sustain for years a steady load of an immense pile of bricks and mortar would soon give way under the constant repetition of strains to which the girders of the elevated railroads are subjected, though the trains might weigh considerably less than the building. Careful experiments

have shown that as the continual dropping of water will wear away the hardest stone, so the continual repetition of even a moderate load will fracture the best steel. As we decrease the load, the life of the structure increases. A steel axle will stand some hundred thousand repeated applications of a given load, say one-third the breaking load. The load when decreased to one-fourth the breaking load, can be applied two or three million times, and as the load is further decreased the number of applications can be increased, until a really safe life is reached.

Many will at first sight be inclined to believe that this is already obtained if a piston-rod or axle or crank-pin will stand 3,000,000 repetitions of the ordinary working strain before breaking. A simple calculation will show the fallacy of this notion. A Consolidation engine with 48 in. drivers makes 420 revolutions in running one mile, and will, therefore, make 3,000,000 revolutions in running 7,143 miles only. We imagine few of our readers would relish renewing their axles, etc., after such a very short mileage, and would prefer something which they could be tolerably sure would not break under at least 100,000 miles. This, however, means 42,000,000 repetitions and reversals of strains on axles, crank pins, and piston-rods.

It is evident that under the circumstances the ability to stand repeated strains becomes of supreme importance. That these requirements can be amply met, is shown by the fact that there are numerous steel driving axles which, under heavy engines and under trying conditions, have run 400,000 miles. Our own experience is that it is not impossible or even difficult to obtain steel axles, crank-pins, coupling rods and piston-rods that are practically absolutely secure against breakage in service, their life being only limited by wear due either to dust or occasional deficient lubrication.

#### The Present Field for Railroad Building.

There are always numerous projects for constructing new railroads, but we hear little about them at times, because the promoters have no hope of getting the capital to carry them out. Since business began to grow better, or ceased to grow worse, we hear a good deal about them, of many which have no capital behind them and which depend for their execution wholly upon the public confidence in bonds of new companies, which grows less with every period of activity in construction, but also of not a few which are undertaken by old and solvent companies, which can get all the capital they want on easy terms. During the last period of activity in construction, comparatively a very small part of the additions to the railroad system were made by new companies, and many of these seemed to have much better than the average chances of success; yet a very large proportion of them, and of not a few extensions of weak old lines, have turned out badly; and those who bought West Shore, New York, Chicago & St. Louis, Chicago & Atlantic, Toledo, Cincinnati & St. Louis, and East Tennessee bonds are not likely to take new railroad securities again unless some solvent company is behind them.

So far the lines which are sure to be built are mostly near the western frontier, but it is noticeable that there is little doing toward the north, where there is most fertile land unprovided with railroads, and much further south, where lines are already numerous to the very edge of the arid belt, or to the debatable country between the farming and grazing country. The Chicago, Burlington & Northern, it is true, is built to serve the extreme north; but the lines which the Chicago, Burlington & Quincy has projected in Nebraska north of the Platte, the extension of the Fremont, Elkhorn & Missouri Valley, made in the interest of the Chicago & Northwestern, and the considerable systems about to be begun in Kansas by the Atchison, Topeka & Santa Fe, and the Missouri Pacific, are all in country where the land is less fertile, or rather the crops less certain, than in the adjacent country already occupied, or country still unoccupied in North Dakota and some in South Dakota. Why is it that especial attention is paid now to Kansas and Nebraska and less than usual to Dakota? Doubtless because the course of emigration is now considerable to the former and little to the latter. But why is this? Because the crop of the north is wheat, and wheat-growing so far from market at present prices is unprofitable, and further south corn grows at least as well as wheat. So just now the tendency is to occupy what lands can be found on the borders of the grazing country which promise to yield tolerable average crops, even if not tolerable crops every year, and the railroads, as always, prepare the way just as soon as it is evident that there will soon be something to support them.

The proposed line of the Milwaukee & St. Paul to

\* See Railroad Gazette.



Kansas City is to secure to this company a share of the through traffic of this southern corn, hog and cattle-growing country, as the Chicago, Burlington & Northern is to secure to the Burlington road a share of the through traffic of the northern wheat-growing territory, neither being in a territory which grows rapidly or has for some time. The Milwaukee & St. Paul's line was provided for in the original mortgage of the Chicago & Pacific, Western Division, several years ago, so no one need be surprised at its being undertaken. There is not the slightest public need for it any more than there is for the Chicago, Burlington & Northern, but it may possibly be a good thing for the Milwaukee & St. Paul Company. It is somewhat amusing to find people in New York who thought the building of a fourth line (the West Shore) between New York and Buffalo, or a second line (the South Pennsylvania) between Philadelphia and Pittsburgh an unwarranted interference with investments already made, look with equanimity upon and perhaps aid in making a fifth line between St. Paul and Chicago (the Chicago, Burlington & Northern) or a sixth (the Wisconsin Central), a fifth between Council Bluffs and Chicago (the Milwaukee & St. Paul), and a fifth between Kansas City & Chicago. All these spoil traffic for somebody, and add no needed facility to commerce; they are unlike the West Shore chiefly because the business which they further divide is smaller in amount than that between New York and Buffalo and because they cost much less.

Railroads, such as are here mentioned, projected by old and solvent companies as extensions to their systems, are less likely than any other new lines to be unwisely planned, and to fail to pay interest on the money borrowed to build them. The managers of the old companies know better than any one else can what is the actual growth and what the traffic resources of the country adjacent to them, and they should have no other interest in building the roads than the permanent interests of their companies. It is true that they sometimes do have other interests; but it will be found, we think, that it is not often the officers or directors of dividend-paying companies who make money in connection with the construction of new roads. The one mistake the old companies seem inclined to make is the building of new lines in new country before their time, to which they are impelled by the fear, sometimes the certainty, that if they do not occupy the country in their front some rival company will, to their lasting injury. It is questionable if the Western railroads are not preparing to do this now, and whether they would not serve themselves and the country better by taking more than one year for the execution of the new lines they have planned.

#### East-bound Rates Threatened.

A danger which, as we write, threatens the maintenance of through rates from the West to the East illustrates what tremendous injury may be caused by a difficulty concerning a comparatively trifling traffic. Complaint is made at St. Louis that recently the Chesapeake & Ohio has been taking the larger part of the shipments thence by rates 8 cents per 100 lbs. less than the regular trunk-line rates. The Chesapeake & Ohio is not a party to the trunk-line contract, but there is an informal agreement that it may make rates 2 cents per 100 lbs. less than the regular trunk-line rates. From St. Louis to Baltimore the regular rate is 26 cents, but the Chesapeake & Ohio, it is said, has been taking the business recently at 18 cents, which naturally secures the larger part of the freight.

Now the larger part of the St. Louis business at this time is not a large business. The largest shipments in any one year thence as far as the western termini of the eastern trunk lines have been 384,500 tons, and 4 per cent. of the total trunk-line movement eastward. But probably more than half of this went to interior points in the East which the Chesapeake & Ohio cannot reach with a through rate, and another large part is for consumption in Eastern sea-board cities, to which it cannot carry without a loss if it charges less than the regular trunk-line rate. Even if it should take half the St. Louis shipments, however, they would average less than 4,000 tons a week, while the total over the trunk lines averages about 200,000. Now, a contest over this 2 per cent. of the business may result in destroying the profits on the whole east-bound traffic, not one-tenth part of which could the Chesapeake & Ohio obtain by any possible reduction of rates. The other railroads might expect to make, altogether, some \$20,000,000 of profits a year out of the through east-bound freights, and the Chesapeake & Ohio by taking

half of the St. Louis shipments would deprive them of less than \$400,000 of it. So far they have lost to it probably not \$20,000 worth of business; yet, no one questions that if the diversion continues as it has been for a week or two past, the Chesapeake & Ohio rates will be met, and if an 18-cent rate is made at St. Louis, the rate will be made about 15 cents from Chicago, and corresponding reductions made from other Western points, and there will be no profit in all the immense traffic.

Why, then, should not the railroads suffer the loss of the \$400,000 per year to save the other \$19,600,000? If there was but one company carrying all the traffic and receiving all the profits, this might be seriously considered, and if the interests of the Eastern trunk lines alone were consulted, a permanent loss of half the St. Louis business might be preferred to the possible alternative of reducing rates. But while the St. Louis shipments are but 4 per cent. of the total trunk-line shipments eastward, they are 100 per cent. of the through eastward shipments of some of the St. Louis roads, and these roads, which have so long carried eastward about 20 per cent. each of the total St. Louis shipments, naturally will not permit a new line all at once to take 50 or 60 per cent. of them.

This is the only case in which any serious complaint of cutting rates on east-bound shipments has been made this winter, and it may have been settled before this reaches our readers. We refer to it chiefly as illustrating how a disturbance of the rates on a comparatively insignificant business may result in suspending interest on hundreds of millions of railroad investments.

The directors of the New York, New Haven & Hartford Company have definitely rejected a proposition laid before them to lease the New York & New England Railroad on terms that amounted substantially to the payment of the net earnings as rental, with a guarantee that the amount should be sufficient to pay the fixed charges on the leased line. It is said also that the proposition contained a clause providing that as much through business as possible should be diverted from the Boston & Albany and the Shore Line and sent over the New England road. The rejection, it is stated, was by so decided a vote that there is no probability of any further negotiations, for the present at least.

There is no doubt that it would be an advantage to the New Haven Company to control a line through to Boston, and it is quite probable that if the offer had been simply to lease it a line from Hartford to Boston it would have been accepted. But the New York & New England is a great deal more than the eastern end of a line from New York to Boston, and the lease might lead the New Haven Company into a field entirely outside of that to which it has heretofore confined itself, and might involve it in complications which would require a complete change of its traditional policy.

The New York, New Haven & Hartford road has always occupied a peculiar position, holding what is practically the only all-rail route into New York from the eastward. There are several all-rail lines between Boston and New York, but all of them must use the New Haven road for a considerable part of its length. The Springfield route, the oldest of all the rail lines, runs over this road for the entire length of its main line from Springfield to New York. The Shore Line uses its tracks from New London to New York, while over the New York & New England there are two alternate routes, one by way of Hartford and the other by way of the Air Line and Willimantic; this last, however, not being at present in use for through travel, although it is the shortest of all the lines. The company has always maintained pleasant relations with the Boston & Albany, whose road forms the rest of the Springfield route, and with the Boston & Providence and the New York, Boston & Providence roads, which go to make up the Shore Line. Numerous attempts have been made to build a parallel line between New York and New Haven, but while company after company has been organized on paper, none of them has succeeded in securing the capital to build its line in the face of the powerful opposition of the existing road. What the New Haven company has to guard against, in making a lease of the New York & New England, is a rupture of its present relations with the Boston & Albany, which, with its strong financial backing, would not find it difficult to make up a new line from Springfield to New York, either under some of the existing charters or by a new company, which could readily be organized, and which could utilize parts of existing roads to save the construction of some of the most difficult and expensive portions of a new line. It

may be possible for the New York & New Haven to lease the New York & New England without breaking with the Boston & Albany and occasioning the construction of a new line to New York, but it has much more to lose by a rival road than to gain by a lease of the New York & New England; and it is not likely to execute the lease, if a new road is thereby rendered probable.

The total freight movement from the West to the East has not decreased in January to anything like the extent indicated by the falling off in Chicago shipments. The indications are that the total trunk-line movement eastward may have been a sixth less than last year in January, and rather greater than in 1884, while the Chicago shipments were, perhaps, 90 per cent. less than last year and 30 per cent. less than in 1884. It must not be forgotten that there is an immense movement of freight of other kinds than those which form the bulk of the Chicago shipments, and that this movement is likely to keep on unaffected though grain exports cease entirely. The movement of freight eastward since December has not been very large, and has been considerably less than last year, but the decrease in it has not been nearly as large in proportion as the decrease in the total Chicago shipments, and nothing approaching the decrease shown by the weekly Chicago reports. The Chicago shipments are, it is true, immensely larger than those from any other one point, but they are sometimes not more than one-fourth of the total brought from the West to the trunk lines, and in January last year, when they were largest, were but 48½ per cent. of that total.

The through shipments of freight from New York to the West reported for the first three weeks of January were about the same as for the corresponding period of last year, which were 15 per cent. less than in 1884, about the same as in 1833, and less than in 1882 and 1880. The shipments last year and in 1882 were, doubtless, largely increased by exceptionally low rates, but it is somewhat disappointing to find that the increase, which had been important in every month since August, has ceased for the time.

Though the value of our exports last year was \$60,520,000 (8 per cent.) less than in 1884, there were four months in 1885 when there was an increase over the corresponding months of 1884—January, April, May and October.

The largest decreases in exports were in the last two months, when they were nearly as great as in the previous ten months of the year, but these two are just the months when the imports increased most.

The figures for these two months compare as follows:

Exports:	1885.	1884.	Decrease.	P. c.
November....	\$67,542,176	\$78,804,670	\$11,262,494	14.3
December ..	74,273,330	91,344,155	17,070,825	18.7
Two mos....	\$141,815,506	\$170,148,825	\$28,333,319	16.6
Imports:				
November....	50,602,184	45,211,416	5,390,768	11.9
December....	51,894,453	42,170,993	9,723,460	23.5
Two mos....	\$102,496,637	\$87,382,409	\$15,114,228	17.3
Ex. of exp....	39,318,869	82,769,416	43,447,547	52.5

There is but one favorable conclusion to be drawn from this: in spite of the great decrease in exports the country has more confidence and feels richer than it did a year ago, else when it exported one-sixth less than a year ago, it would not have imported one-sixth more.

It should be said, however, that exports were at their lowest in these two months of 1884 and in the following two months of 1885, and that while the imports last November and December were much greater than in 1884, they were less than in any other year since 1880, having been for these two months, in millions of dollars:

1880.	1881.	1882.	1883.	1884.	1885.
94.5	114.0	114.7	110.7	87.4	102.5

while the exports, though less than in some years, were above the average in 1884, having been, in millions of dollars:

1880.	1881.	1882.	1883.	1884.	1885.
181.9	147.1	173.9	155.6	170.1	141.8

so that the excess of exports over imports has been for these two months:

1880.	1881.	1882.	1883.	1884.	1885.
87.4	33.1	59.2	44.9	62.7	39.3

and, therefore, was larger in 1884 than in any other year since 1880. This prevents the result in 1885 from being so bad as a comparison with 1884 alone makes it appear; but it remains true that the excess of exports in the last two months of 1885 was the smallest for many years, with the exception of 1881, which was after a universal crop failure, yet at a time when business was most active and imports at their maximum.

Now it cannot be said that the ability of the country to import is gauged by its exports, yet it is question-



able whether the confidence which has led to increased imports is justified by the condition of business—whether it is not based on a too sanguine expectation of general industrial activity in 1886. So far as exports are concerned, there certainly is nothing to justify such an expectation. The country has not been and is not making large profits; but it seems to be convinced that we have seen the worst of the dull times, and this makes an immense difference in the willingness of capitalists to prosecute new enterprises, which willingness of itself causes a great deal of activity in business. The danger is that too much will be attempted; for while there may be enough to keep the existing enterprises pretty well employed, there are no signs yet of a demand which will soon support any large increase of them.

#### Illinois Central Earnings.

The Illinois Central Railroad Company had larger earnings on its Illinois lines last year than in 1884, but smaller than in any other year since 1879. The earnings of its Iowa lines were less than in any year since 1879, but those of its Southern division were the largest it has ever had. For 15 successive years the gross earnings of the several divisions have been:

Year.	Illinois lines.	Iowa lines.	Southern Division.	Total.
1871.....	\$7,05,440	\$1,348,091	.....	\$8,403,531
1872.....	6,813,433	1,413,321	.....	8,226,754
1873.....	6,591,025	1,677,300	.....	8,268,325
1874.....	6,272,823	1,627,895	.....	7,900,721
1875.....	5,932,429	1,850,127	.....	7,782,556
1876.....	5,421,092	1,619,277	.....	7,040,369
1877.....	5,126,775	1,513,140	.....	6,639,915
1878.....	5,572,628	1,538,558	\$2,842,474	9,953,618
1879.....	5,711,282	1,523,182	3,357,305	10,591,769
1880.....	6,529,324	1,775,487	3,716,902	12,021,713
1881.....	6,733,954	1,852,443	4,059,151	12,645,548
1882.....	6,959,780	1,945,532	3,848,537	12,753,849
1883.....	6,674,703	2,025,110	4,304,930	13,004,743
1884.....	6,158,312	1,712,390	4,320,131	12,190,833
1885.....	6,508,112	1,678,336	4,434,816	12,621,264

From this we see that the earnings of the Illinois lines were less last year than in 1871, 1872 or 1873, and, we may add, less than in any previous year after the war. Until 1878 there were 705 miles of these Illinois lines; since 1879 there have been 953. The earnings per mile last year were therefore \$6,619, while in 1877, when the total earnings were smallest, they were \$7,266 per mile, and in 1880, when they were largest, \$10,462. Thus the Illinois system, which includes all the railroads owned directly by the company, is not an improving property. Some considerable part of the increase of earnings since 1878 must have been due to the 248 miles of branches added, and with these the earnings are less than before 1874.

The Iowa lines have had no change in mileage since 1869, and we know of no other line of railroad through a new and fertile country which has shown so little improvement. Its earnings were nearly the same in 1873 as in 1885, and in 1875 were 9 per cent. more. They rose after 1879, like those of most railroads, but have fallen decidedly since. The country on the line, especially on the western half of the line, has grown greatly in population since 1879 (it grew very slowly before), but railroads increased there faster than the traffic. The Illinois Central leases its Iowa lines for a percentage of their gross earnings, and probably only in a very few years have the net earnings been equal to the rental. The lease will expire Oct. 1, 1887, and there seems to be little inducement for the Illinois Central to renew the leases (the Iowa lines belong to three different companies) on the old terms. In fact, they would probably be worth more to either of three other companies, the Chicago & Northwestern, the Chicago, Milwaukee & St. Paul, and the Chicago, Burlington & Quincy, for the reason that these companies have lines to Chicago, while the Illinois Central has but 80 out of the 200 miles over which the traffic of its Iowa lines passes to and from Chicago. The traffic between these lines and New Orleans, which the Illinois Central carries all the way from Dubuque to New Orleans, 1,007 miles, must be insignificant. The average earnings per mile of the 402 miles in Iowa were but \$4,175 last year, and when largest, in 1883, were \$5,038. The smallness of them is the more notable because four-fifths of the road is a main line extending entirely across Iowa. It is not, however, in position to command much through traffic for this line, the railroads west of it belonging to rival companies.

The Southern Division was not worked by the Illinois Central until 1883, but nearly all of the stock of the "Chicago, St. Louis & New Orleans" Company, which owns it, was owned by the Illinois Central, and we have given its earnings since its organization was completed, after foreclosure in 1877. Large additions to the mileage of this division were made during 1884 (140 miles of branches), but they seem not to have been very effective, for though the table shows larger earnings last year than ever before, it was only in the first half of the year that there was a gain. In the last half its earnings were somewhat less than in 1884. In 1881 the earnings per mile of this Southern Division were just about as great as those of the Illinois lines, and greater than those of almost any other Southern railroad, but considering the increase in mileage they have fallen off greatly within the last two years. The cause is not quite clear. The cotton crops of 1883 and 1884 were light and last year's heavier, but the earnings were largest after the small crops, and of late months, since the last crop has been moving, have fallen off. The New Orleans Exposition added something to the earnings in 1884, doubtless, but only in the last month; probably the opening of the new railroad between Memphis and New Orleans has diverted some

traffic, though it is nowhere, except at New Orleans itself, very near. It is probable also that last year's crops were not as good on this line as was generally supposed. While the total of the last cotton crop is certainly a great deal larger than the previous one, it was very much damaged in August, and more in some parts of the South than elsewhere, and most, it appears, in two or three states east of the Mississippi. Moreover, the grain crops were not good there. At least most of the lines east of the Mississippi and west of the Alleghenies have been showing reduced earnings recently, like the Southern Division of the Illinois Central.

In the aggregate, the earnings of the three grand divisions of this company last year were never much exceeded except in 1883, when they were \$443,479 (3½ per cent.) larger, the excess in 1881 (\$24,284) and in 1882 (\$132,585) being insignificant.

Last year was in an important respect unfavorable for the Illinois lines of this company. Rates to most places on these lines to and from the East were so extremely low that there was little or no advantage in shipping to the lake at Chicago or getting Eastern goods at that place. This had a great effect on the earnings of these lines after 1873, and especially in 1876 and 1877. That it had less effect last year is probably due to the fact that there has long been a great and permanent diversion of traffic from this road to the numerous east-and-west lines which cross it, most of which have been opened since 1871. The Illinois Central has held its own by taking a much smaller share of a much greater traffic, and by the increase of north-and-south traffic, for which these lines do not compete. Its experience, however, shows that it is not safe to count on a continuous growth of earnings by western railroads, even if the growth has been almost uninterrupted heretofore.

#### A St. Louis Railroad's Profits.

The Vandalia Line, or rather that part of it between Terre Haute and St. Louis (St. Louis, Vandalia & Terre Haute Railroad), as the St. Louis line of the Pennsylvania Railroad and a principal line between two important cities, with an exceptionally fertile and well-peopled country on its line, ought, one would think, to be a profitable road. It has good gross earnings, though hardly what would be expected of a main line without a single branch, amounting to nearly \$10,000 per mile in 1880 and 1881, \$10,083 in 1882, and \$10,745 in 1883, but falling to \$9,414 in 1884 and \$8,670 last year; but its net earnings are small in proportion, though they reached \$2,818 per mile in 1880, and rose from \$2,372 in 1884 to \$2,855 in 1885. This, however, leaves but a small margin over the fixed charges, and sometimes does not meet them, as generally previous to 1880, and in 1881 also, the aggregate surplus since 1879 being about \$131,000, or \$22,000 a year, for 158 miles of road.

Last year it was made larger than ever before except in 1880, though the gross earnings were the smallest since 1879. This was due to the very large reduction of 17½ per cent. since 1884 and nearly 30 per cent. since 1883 in the working expenses, though the traffic was not smaller but larger than the year before. The decrease was chiefly in maintenance expenses, maintenance of way costing 38 per cent. less than in 1884 and 62 per cent. less than in 1883; motive power and equipment 18½ per cent. less than in 1884 and 29 per cent. less than in 1883. In fact, the expenses were less than in 1879, though the passenger traffic was nearly 50 per cent. and the freight traffic 25 per cent. greater than then. It is not at all probable that expenses can be kept down to these greatly reduced figures.

This road is leased for 30 per cent. of its gross earnings by the Terre Haute & Indianapolis Company, and last year for the first time were the net earnings enough to pay the rental. Sometimes the rental was not enough to meet the fixed charges, and then the lessee has advanced them, charging the lessor therefor and collecting when the rental exceeded the fixed charges, as it has done every year since 1878.

The experience of this company illustrates how hard it is for the St. Louis roads to make profits. We cannot tell so well with the other lines east of St. Louis, because they have branches; but this is a straight main line, with as much of the through St. Louis traffic as any road, and doubtless a large local traffic; yet it does not always earn 5 per cent. on a capital of \$50,000 per mile, and never 6 per cent. It is not for want of traffic; none of the roads from Chicago westward paying 6, 7 and 8 per cent. dividends earns nearly as much per mile; it is solely because it is in the territory, including most of Illinois south of the Chicago, Burlington & Quincy Railroad, where trunk-line rates prevail and affect to a considerable extent local rates. The Vandalia road last year was able to collect but 0.73 cent per ton per mile on its freight traffic, which is nearly as low as the average on the Eastern trunk lines (0.688 cent on the New York Central last year), and much lower than on any Chicago road: the Chicago & Alton, which has the lowest rate, and itself has a large St. Louis through traffic, carried at rates per mile lower than the Vandalia's (because part of a longer line), got 1.01 cents per ton per mile in 1884. The difference between this and the Vandalia's rate would have given the latter no less than \$302,000 of additional net earnings—increased them from \$451,000 to \$753,000, and increased the surplus over fixed charges from \$85,000 to \$387,000, which is 9½ per cent. on the company's capital stock. A very large part of the east-and-west railroads north of the Ohio River and south of the lakes are suffering in the same way, and there seems to be no remedy for it. In part, doubtless, it is due to lake navigation, which limits rates from St. Louis, Cairo and Memphis as well as from Chicago; but this is not the only cause. Last year, of course, the trunk line war made rates as bad as possible, and a very important improvement may be expected simply

by keeping the peace. Low rates on these routes are inevitable, however; in only one year (1880) of the last seven has this road succeeded in getting as much, 1 cent per ton per mile. Traffic grows at times, but rates go down usually faster than traffic grows, and since 1882 freight traffic has fallen off. One of the strangest things in railroad history is that in spite of the unprofitableness of the traffic and of most of the railroads here, it is a favorite field for railroad projectors. There are usually two or three new through lines to St. Louis trying to get themselves built, and not a few lines in this territory succeed in getting built—and getting into bankruptcy soon afterwards.

Chicago through rail shipments last week were nearly the same as the week before, that is, very small, but apparently with better reason, because the traffic of the lines west of Chicago was more interrupted by snow last week. For this week ending Jan. 30 the shipments have been for seven years including only flour, grain and provisions this year and last, and freight of all kinds previously, in tons:

	1880.	1881.	1882.	1883.	1884.	1885.	1886.
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Thus the shipments this year were but one-third those of last year, when rates were not maintained at the regular tariff, it is true, but when the reduction had not yet become very great, it being supposed that as much as 20 cents was obtained, instead of the regular grain rate, then as now, 25 cents.

To compare with years previous to 1885 we must add something like 13,000 tons for the higher-class freight, and having done this we find the shipments this year much less than in any other except 1880, when a 40-cent rate was maintained, and 1884. The enormous shipments in 1882 were at about 12½ cents, and were entirely unprofitable.

For six successive weeks the total shipments and the per centage taken by each railroad have been:

	Dec. 26.	Jan. 2.	Week ending, Jan. 9.	Jan. 16.	Jan. 23.	Jan. 30.
Tons:						
Flour.....	7,024	4,495	3,206	3,804	4,416	3,551
Grain.....	18,831	19,440	17,056	10,713	12,716	12,344
Provisions.....	11,715	10,278	8,913	8,905	8,600	9,351
Total.....	37,573	34,213	29,175	23,482	25,952	25,246
Per cent.:						
C. & Grand T.....	10.6	11.8	7.7	7.2	7.5	9.0
Mich. Cen.....	13.5	11.0	13.4	12.0	12.0	12.0
Lake Shore.....	20.3	14.7	16.5	14.7	16.3	13.5
Nickel Plate.....	10.0	10.4	8.7	6.4	8.3	7.5
St. Wayne.....	16.0	16.4	16.2	23.7	18.1	21.6
C. St. L. & P.....	13.2	13.8	11.8	16.4	12.4	16.1
Balt. & Ohio.....	7.0	8.9	13.5	12.0	14.9	11.1
Ch. & Atlantic.....	9.4	13.0	12.2	7.8	10.5	9.2
Total.....	100.0	100.0	100.0	100.0	100.0	100.0

The flour shipments last week were 19½ per cent. and the grain shipments 3 per cent. less than the week before, but the provision shipments were 6½ per cent. larger. These latter were not much (1,132) tons less than in the corresponding week of last year, while the flour shipments were 11,363 tons (76 per cent.) and the grain shipments 37,996 tons (75 per cent.) less than then.

The most notable change in percentages last week is the great gain of the two Pennsylvania roads, and the decrease by the Baltimore & Ohio and the Lake Shore. The three Vanderbilt roads together and the two Pennsylvania roads together have taken the following percentages in eight successive weeks:

Vanderbilt's.....	42.7	46.6	43.8	36.1	38.6	33.1	34.6	33.0
Pennsylvania.....	28.3	28.4	29.2	30.2	28.0	40.1	30.5	37.7

It was in the weeks of comparatively large shipments that the Vanderbilt roads had the largest share, and it takes a large percentage of the total shipments now to make up for small ones early in December.

Though the Chicago & Atlantic had a smaller percentage last week than in any other of the last six weeks save one, it still carried more grain than any other road. The whole quantity was so small, however, that it had very little significance, and the Chicago & Atlantic carries very little but grain. The Chicago, St. Louis & Pittsburgh carried most provisions (25½ per cent.), and the Fort Wayne came next (22½ per cent.).

It must not be forgotten that the shipments of higher-class freight, not included above, do not usually vary greatly from week to week, but may be 15,000 tons in a week when the flour, grain and provisions amount to 75,000 as well as when they are, as last week, but 25,000 tons. Now, as this unreported freight pays much higher rates of freight than the flour, grain and provisions, it may well be that the gross earnings from it were larger last week than those on all the reported freight, and that the percentages would be very greatly modified by including them, as is done in the pool. This miscellaneous freight is chiefly carried by the older roads, and largely by the Michigan Central, the Lake Shore and the Fort Wayne.

The Chicago shipments eastward have truly been very small recently, but they have not been so very small as the weekly reports indicate. According to the shipment of flour, grain and provisions for the three weeks ending Jan. 31 were about 77,037 tons. The complete report shows that the actual shipments of all classes of freight were 114,394 tons, or 48 per cent. more than the weekly reports show. The falling off from December has reached the higher-class freights, but not to the same extent as the grain, etc. Thus in December the average weekly shipments of flour, grain and provisions were 38,072 tons; of other freight, 16,085. In the first three weeks of January the average of flour, grain and provisions had fallen to 25,679 tons; of other freight, to 12,452. Thus, while the decrease was 32½ per cent., in other freight, not included in the weekly report, it was only 22½ per cent. It is not quite correct to call this other freight, not included in the weekly reports, as "higher class freight." It includes all the higher



class freight and something more, probably a large amount of grain, because the weekly reports are not complete.

Now that the grain, etc., amounts to but little the other freight makes a very important part of the whole. In December it was 29.7 per cent. of the whole, and in January, though less in amount, it was 32.6 per cent. As this includes all the best paying freight, evidently a judgment based on the weekly reports, excluding it all, is likely to be very far out of the way—erroneous as to the shares of the different lines as well as to the quantity carried and the earnings and profits from it. Comparison with the actual percentages shows generally some correspondence—that is, where the weekly reports show a considerable increase or decrease in the percentage of any road there is usually some change in the direction indicated; but the actual percentages in the weekly reports are often 2 per cent. or more out of the way.

The chief value of the weekly reports is, in the absence of anything more complete, to show the *tendency* of shipments.

It is wonderful how very little the proportions of the exports of grain from the four Eastern cities have varied of late years. The percentage of the total exports from the four markets going from each has been, for three years:

	New York.	Boston.	Phila.	Baltimore.
1885.....	58.8	12.7	10.1	18.4
1884.....	58.1	13.9	7.6	20.4
1883.....	57.5	12.6	8.6	21.3

Thus in these three years the proportion of New York varied only from 57.5 to 58.8 per cent.

Some efforts have been made to explain the small grain shipments from Chicago, in which the imagination has been drawn upon for the facts. One is that the grain is going down the Mississippi in barges, the fact being that there has been but one week since navigation closed that there have been considerable shipments that way, and that for the last six weeks reported (ending Jan. 23), out of total shipments of 11,908,665 bushels, only 811,328 went down the Mississippi. Another explanation is that the Chesapeake & Ohio is taking the grain to Newport News for export—which has been true for but two weeks only. The total receipts of grain at Newport News since navigation closed to Jan. 23 were 141,826 bushels, out of a total of 22,373,000 at all the Atlantic ports; and no exports at all are reported from that place in that time. The receipts at Richmond have been much larger, but even these have only amounted to 262,735 bushels. They were, probably, chiefly by the Chesapeake & Ohio, but for domestic and Southern consumption, and not for export. In the last two weeks considerable corn has been taken by the Chesapeake & Ohio. But the grain shipments from Chicago are small because there is very little grain moving at this season.

While the railroads brought to New York 73½ per cent. of its total flour and grain receipts last year, they brought only 66½ per cent. of the grain, excluding flour, the canal, which was open only 6½ months of the year, bringing 30.4 per cent. of it, and more than any one railroad, though the New York Central pressed it close, bringing 27,354,000 bushels, against the canal's 29,927,000.

In 1884 the canal brought 43.4 per cent. of the grain and the railroads 55 per cent., and the New York Central brought 21,364,000 bushels, the canal 37,924,000, and rates were not by any means well maintained then.

Flour formed a smaller proportion of the receipts in 1885 than in 1884. The quantities, reduced to bushels, have been for six years:

	Grain.	Flour.	Total.	P.c. flour.
1885.....	98,419,558	28,217,873	126,637,431	22.3
1884.....	87,456,488	27,961,558	115,418,046	24.2
1883.....	91,032,277	28,373,706	119,405,983	23.8
1882.....	83,661,188	26,501,132	110,162,320	24.2
1881.....	110,000,125	25,780,962	135,781,087	19.0
1880.....	140,492,291	24,409,134	164,892,425	14.8

The flour receipts have increased materially since 1880, while the receipts of unground grains have fallen 23 per cent. This has been favorable to the railroads, for the canal boats do not carry flour; but the larger proportion of grain in 1885 than in 1884 was favorable to the canal.

The different railroads do not carry the same proportion of flour as of grain; for instance, last year the New York Central brought 41.7 per cent. of all grain received by rail, but only 32.3 per cent. of the flour, the Erie, which had but 31.4 per cent. of the grain brought 27.4 per cent. of the flour, and the Pennsylvania, carrying 15 per cent. of the grain, had 20 per cent. of the flour. The West Shore had about the same proportion of both, but the Lackawanna brought 9 per cent. of the flour and 5 per cent. of the grain.

The indications are that the flour is more easily diverted from one road to the other than the grain, but it does not clearly appear why the Erie brought 36 per cent. less grain to New York than the New York Central and only 15 per cent. less flour; or why the Pennsylvania brought 64 per cent. less grain, but only 38 per cent. less flour.

A statement has been received by the Cullom Committee of the proportion of "inter-state" traffic on the Baltimore & Ohio in the months of August, 1884, and March, 1885 or rather of the earnings from that traffic, for the statement that 64 per cent. of the "tons carried," and 19.4 per cent. of the passengers carried, passed from one state into another throws little light on the amount of traffic, a ton from Chicago to Baltimore, 853 miles, counting no more than a ton from Pittsburgh to Braddock 10 miles. More significant is the statement that 80.5 per cent. of the freight earnings and 52.9 per cent. of the passenger earnings were from inter-state traffic.

The Baltimore & Ohio has probably a larger proportion of

inter-state traffic than almost any other trunk line. Maryland is small, and there are no two very important traffic centres in any one state on the lines of the company except Pittsburgh and the Connellsville coke regions, and Baltimore and the Cumberland coal mines; while the shipments from Cumberland to Baltimore, while beginning and ending in the same state, are still "inter-state" traffic, because the railroad over which they are hauled lies for a considerable distance on the south bank of the Potomac, in West Virginia.

The larger proportion of the passenger traffic of most railroads is local, but not a little of the Baltimore & Ohio local travel is "inter-state," passing from various points on the system to Washington, just outside the state of Maryland. Nowhere on the Baltimore & Ohio system is there anything comparable to such traffic within the borders of one state as exists between Philadelphia and Pittsburgh, or between New York and Buffalo over the New York Central.

Immigration is not now reported by the Bureau of Statistics for places on the Canadian frontier. There is no provision for official returns at these places, but unofficial reports at the leading points, Port Huron and Detroit, would be valuable. Canadian authorities have claimed that what our Bureau of Statistics reported as immigration to the United States at the points of entry included all the immigration passing through this country to Manitoba, which for two or three years was much greater than the immigration at these places to the United States. This may have been so, but it ought to be and to have been possible to get a tolerably correct statement of the Manitoba immigrants separately. However that may be, the error on that account would be much less than heretofore; for not only are there fewer immigrants to Manitoba, but most of them are likely to go by the Canadian Pacific and not enter the United States at all.

We may not know what the effect of this omission of arrivals from Canada was on the reported number of immigrants last year, but it caused a reduction for 1884 from 453,983 to 403,230. Last year the difference on that account probably was very much less; for not only was the Canadian Pacific route open then, but the \$1 rate of the Pennsylvania Railroad prevented the ordinary proportion of arrivals in the United States from Europe via Canada, which has sometimes been important.

Preserving the figures heretofore reported for years previous to 1885, the arrivals of immigrants in successive years have been:

	1880.	1881.	1882.	1883.	1884.	1885.
	586,008	710,868	712,542	560,196	453,983	320,411

Allowing for the omitted places, the arrivals in 1885 were probably not more than 350,000, and thus more than a fifth less than in 1884, and not half as great as in 1881 and 1882. The immigration added 1.4 per cent. to the population in 1881, and only 0.52 in 1885. It makes the probable population at the beginning of 1886 59,200,000, the natural increase having been 1,150,000, or 3½ times the emigration during 1885.

The arrivals of immigrants at the leading ports in the last three years are reported as follows:

	New York.	Philadelphia.	Boston.	Baltimore.
1885.....	273,594	22,745	19,919	8,086
1884.....	322,675	19,064	26,792	30,707

Thus the Baltimore arrivals fell off 74 per cent., while there was a gain at Philadelphia. This was probably due to the Pennsylvania Railroad dollar rate, its tickets being sold almost entirely by agents of New York and Philadelphia steamer lines. Now the boat is on the other foot; for the Baltimore & Ohio alone is selling immigrant tickets for a dollar, while the other roads are trying to get \$7. But the Baltimore & Ohio cannot make this rate from New York or Philadelphia (at present), for want of a line, and it will therefore need to divert the immigration to the Baltimore steamers to an unprecedented extent in order to secure the bulk of the business, as the Pennsylvania did last year, and the Baltimore steamers cannot well carry them all.

A valued correspondent, a practical man of long experience, sends us quite a glowing eulogium of the debt of practical men to scientists and theorists, adding:

"I am not so proud of being a practical man as I was before I learned from M. Rabouef that a locomotive slips her drivers more going down inclines than she does in going up inclines. Now I have been noticing the movement of locomotive engines for many years, and never had any doubt as to the fact that they always slipped most going 'up hill,' and here comes a French savant who quietly convinces me that I don't know anything about even that simple detail of railroading."

Our correspondent's conclusion is undoubtedly right, but in his example he is unfortunate, for it is of a devil's hatchet nature, cutting both ways. It shows why scientists are needed, but it also shows why practical men distrust scientists and why they have frequent reason to. M. Rabouef took a locomotive in a most unpractical way, clapped on all steam-speedily got the drivers to slipping, not "imperceptibly," but in the regular, normal, natural way, and what he really found is that, as he had no load behind him, in going down hill even the tractive force generated by slipping wheels was enough to maintain a high rate of speed. When he came to go up hill he naturally found that he could not do anything of the kind. Hence his conclusion.

Nevertheless, his alleged remarkable results attracted for some time no little attention, and were accepted for far more than their true worth by many. They had, however, the effect of stirring up other scientists to make some investigations with an instrument of precision called a "revolutions-counter," when comparison of the actual number of revolutions shown by the counter with an abstruse mathematical calculation of the number of revolutions a driving-

wheel ought to make in a hundred miles, showed that under practical conditions no "imperceptible slip" whatever occurs with the fastest express trains, or with the slowest, whether going up hill or down hill!

The various facts in regard to these tests have been so recently summarized in these columns (Sept. 4, 1885), that we need not repeat them, further than to state that theory of another kind comes in to reinforce these later scientific tests by showing that it is impossible for a driver to slip at all without slipping violently, for these reasons: The moment it begins to slip the coefficient of friction between rail and wheel falls from about ½ to about ⅓ or less. Consequently, less than one-third of the energy being generated in the engine can go back to the train in the usual way. The surplus must go somewhere, however, and as there is no other work for it to do, it must be, as observation shows, that it is stored in the drivers in the form of velocity, making them "spin."

Our correspondent ends by urging that if practical men will observe and collect facts, they "can always obtain a prompt discussion of probable causes and possible remedies by giving such statistics to any member of either the American Society of Civil Engineers or the Engineers' Society of Western Pennsylvania." He says that as he is not a member of either society, he feels free to say this; and for the same reason we feel free to say that we fear he does honor overmuch to both of those societies in assuming that they have so many barrels of knowledge always on tap, or that, even if they have, the bung-hole is always loose enough to let it run out.

The long list of cleverly contrasted topics (28 in all) bearing on the general question of "Track vs. Rolling Stock," which the New England Railroad Club has adopted for its ensuing meeting on Wednesday of next week (Feb. 10), is certainly an ambitious programme for one evening's meeting, and one which, with all the assistance of the Boston Society of Civil Engineers, they will have difficulty in getting through with if they more than barely touch upon each topic. That the meeting will be an exceedingly interesting one, however, and that much useful information will be elicited, is highly probable. The topics were given in detail, in 14 contrasted pairs, in our issue of Jan. 22.

One particular phase of this question, the proper relation to each other of the forms of rails and wheels, has been much discussed during the past year or two in these columns and elsewhere, and is certainly, if not the most important, yet one of the most disputed points. A committee of the American Society of Civil Engineers has recently been appointed to consider it, but will probably take a year's time at least for preparing its report, and in the mean time the more discussion and the more facts brought out the better, and it is to be hoped that many may be submitted at the coming meeting. Facts are what are chiefly wanted: What are the evidences as to the effect of the form of rails on wear of wheels and of the form of wheels on wear of rails? Under what known conditions does each wear the other more rapidly, and how much more rapidly? This is the kind of evidence which is chiefly needed.

A new system of induction telegraph for sending messages to and from trains in motion, the invention of the indefatigable Edison and two others, was tried this week on the Staten Island Railroad, and, it is reported, with perfect success. It differs from the Phelps induction telegraph, which was described in our issue of Feb. 20, 1885, and has since attracted so much attention, chiefly in the way of obtaining the induction circuit on the train. In the Phelps circuit a tube is carried under the car, between the rails and a few inches above them, and filled with a coil of continuous wire passing around and around between the floor of the car and the rails. Induction is produced between this coil and an ordinary telegraph wire laid in a wooden box between the rails. In the Edison system the tin roofs of the cars are connected by copper conductors, and the induction circuit is through the roof, axles and rails for the entire length of the train. The induced current is produced, not by a special wire between the rails, but by an ordinary aerial wire strung on poles. This was found quite sufficient to work the apparatus satisfactorily, and in the Phelps telegraph it will be remembered that, although the induction coil is ordinarily but a few inches above the telegraph wire, yet that no difficulty has been found in obtaining an adequate current when the car and the wire were 13 ft. apart on different tracks.

The Edison device has the advantage of simplicity, but the possibility immediately suggests itself that in cases where from 10 to 200 wires are strung on poles within the right of way, the "induced currents" might be unpleasantly numerous and confusing. The Phelps system, moreover, is certainly simple enough. If its working be satisfactory, as we have been recently again informed it is, no one could object to its complexity, unless some still simpler system were equally good.

Since there have now been successful experiments by two different systems with telegraphic communications with moving trains, the hope seems not unreasonable that within a few years something of the kind will come into general use. It will prove beneficial, if practicable, to roads of two kinds: those having a large traffic which requires and justifies every possible improvement of the kind, and those having a thin traffic, especially through thinly populated regions, where the expense of maintaining separate telegraph offices, mainly for dispatching purposes, is a burden and inconvenience.

In the description of the railroad spiral on the Georgetown, Breckenridge & Leadville Railway, in our issue of Nov. 27, 1885, evidence has been sent us that some injustice was done



Mr. J. Blickensderfer, now Chief Engineer of the Union Pacific Railway, who located the spiral. In the information which was furnished us it was stated, that, when the spiral finally came to construction, a "complete revision" of the location was made, and "while the idea of the spiral, or loop, was left just as it was, the details of the alignment were greatly modified."

Two comparative profiles which have been sent us make it clear that this gives an unfair idea of the facts. Some changes have been made, indeed, but no more than would appear in almost any two similar profiles, both under charge of the same engineer, and all of them are of minor importance. In fact, the changes are so few as to make it impossible to attempt the invidious task of determining which of the two profiles is the best, and by how much, since the difference between the two is not so great that any opinion could well be formed without careful study of the classification, which is not given.

A correspondent from St. Louis sends us a discussion of the accident described in our issue of Jan. 22, under the head of "The Lesson of a Fortunate Accident," in which he argues at some length that although it appears from the record that the engineer *did* put on more steam and that the derailed train *did* have what our correspondent well calls a "miraculous" escape by being dragged safely the entire length of the bridge and stopped on the other side, yet that saving a train in this unorthodox way, if it was in fact saved by it, is a very dangerous and improper thing to do, and that he believes it by far the safer course is to reverse the engine and put on the brakes in all cases of derailment, whether on a bridge or elsewhere.

Our correspondent, whom we judge to be a practical rail road man, ends by requesting that if any one knows of any other instances where putting on steam in cases of derailment, on a bridge or anywhere else, has had a fortunate (or unfortunate) result, that they will communicate the facts to the *Railroad Gazette*, a request which we take pleasure in endorsing; but pending evidence to the contrary, it appears almost self-evident that in no possible way could less injury have been expected than actually resulted in this case, which is strong presumptive evidence that what was done was well done.

One assertion of our correspondent, that a falling body falls so fast that, however fast or slowly a derailed train were hauled in such a case, its wheels would sink in between the ties as deeply as was possible, is certainly a mistaken one. The wheels, it is true, will take an inconceivably small fraction of a second to fall in between the ties, but then they also take an inconceivably small fraction of a second to move over a tie horizontally. All bodies begin to fall with very great slowness, a fact which we illustrated in discussing the question of "Even vs. Broken Joints" (Feb. 6, 1885), as follows:

"A locomotive falling freely from a great height would fall a mile in about 18 seconds, but if it fell no faster than a train moving at 60 miles per hour falls into the depression of a low tie [while moving 2 ft. horizontally] it would take four hours to fall a mile, or nearly 800 times as long. This is at the rate of fifteen minutes to fall from a high viaduct (330 ft. high), so that a man standing under such a one, who saw a locomotive begin to fall from off it, might light a cigar and almost finish smoking it, before troubling himself to 'stand from under.'"

The *National Car and Locomotive Builder* appears this month as the initial number of an old friend with an enlarged head. Its enlargement of head is not accompanied by any enlargement of body, but we regret to observe that it is accompanied by symptoms not unlike those colloquially associated with such abnormal development, for it permits some ill-informed member of its staff not only to misquote and misrepresent the *Railroad Gazette* (which is a small matter), but to disseminate misinformation in respect to its new topic, the locomotive, by alleging that more or less imperceptible slip of driving wheels occurs during the regular working of American or any other locomotives; a fact disproved not by experiments of "two youths" alone, as our contemporary imagines, but by a series of tests from Zerah Colburn down; while it will find it an interesting task to produce any experimental evidence whatever to the contrary, beyond the easily explicable mistakes of one man!

#### Record of New Railroad Construction.

Information of the laying of track on new railroad lines in 1886 is given in the current number of the *Railroad Gazette* as follows:

Canton & Waynesburg.—Extended from Marks, O., to Summit, 5 miles.

Cresson, Clearfield & New York.—Extended to Irvona, Pa., 4 miles.

Jacksonville, Tampa & Key West.—Extended from De Land Junction, Fla., south to Enterprise, 15 miles.

St. Paul & Northern Pacific.—Extended southeast to St. Paul, Minn., 5 miles.

Shreveport & Houston.—Extended from Logansport, La., across the Sabine River, 1 mile.

Wisconsin Central.—Extended southward to Mukwonago, Wis., 9 miles.

This is a total of 39 miles on 6 lines, making in all 62 miles thus far reported for the current year. The new track reported to the corresponding date for 15 years has been:

Miles.	Miles.	Miles.
1866.....62	1881.....110	1876.....75
1867.....36	1882.....170	1877.....92
1868.....63	1883.....70	1878.....38
1869.....63	1884.....84	1879.....210
1870.....79	1885.....42	1880.....70
1871.....192	1886.....	

These figures include main track only, second tracks and sidings not being counted.

#### NEW PUBLICATIONS.

*The Present Technical Condition of the Steel Industry of the United States.* By Phineas Barnes. Issued by the United States Geological Survey. Washington, 1885.

This concise and clearly expressed treatise on steel treats the various branches of the subject with a completeness that is indicated by the following list of the titles of the various chapters: Raw Material (carbon, silicon, etc.), Processes, Furnaces, Fuels, Refractories, Converting Methods, Basic Process, Apparatus, Steam Machinery, Hydraulic Machinery, Finishing Machinery, Steel Castings, Steel Plates, Testing, Recent Applications of Steel.

The style in which information is imparted is best shown by the following extract, describing the Siemens-Martin, or open-hearth process, of making steel:

"The raw materials of this process are iron ore, pig iron, wrought-iron blooms, steel scrap, and recarburizing material of various kinds and grades. The furnace in which the metal is made, or in some cases simply remelted, is the Siemens regenerative gas furnace of precisely the same general type as that already referred to in connection with the crucible process. In this case, however, the metal is melted, or made, in or on the 'open hearth' of the furnace, into and over which the intense flame passes. This process is so called, as differing from the crucible process, in that the work in the latter is done in closed pots or crucibles, which are set in groups in the compartments of the furnace, and are bathed under their outer surfaces only by the currents of flame. The Siemens furnace for the open-hearth process is somewhat more nearly square, the basin or hearth being in some cases 7 by 12 ft. in size, or, if larger, in about the same proportion. It is inclosed by substantial fire-brick walls, with the needful doorways at the sides, and is covered in with a roof, usually so shaped as to direct the flame somewhat downward upon the body of metal lying in the hearth. The flame traverses the furnace from end to end of the melting chamber, changing its direction of motion with each reversing of the furnace. The currents of gas and air for its supply and maintenance enter through ports at the ends of the furnace, which lead from the regenerators below the melting chamber. After the hearth or 'bottom' of the furnace has been brought to a full heat, the raw materials are put in through the doorways, almost invariably in the solid state and usually without any previous treatment or preheating. For many purposes the stock is piled in so as to fill the furnace completely, the last few pieces being shoved in close under the roof and on the top of the loose pile of material beneath. If the bulk of the charge is made up of heavy pieces, the whole quantity required for the 'heat' is thus put in at once, but if the furnace has been piled full of lighter stock the remainder is thrown in as soon as the bulk has been reduced by the melting and sinking down of the mass.

"For some kinds of metal a quantity of pig iron is put into the furnace by itself and then melted and brought up to a very high temperature. Into this intensely heated bath is put at suitable intervals the remainder of the charge, which, in such a case, is likely to consist of wrought-iron blooms, the ends of steel blooms, and pieces of ingots which for any reason may have been interrupted in going through the rolling mill or forge, and which are almost dead or useless material except for consumption in this form of furnace. These heavier pieces are usually preheated, often to a high yellow heat, so that the actual process of melting shall be made as brief as possible, and (what is even more important) so that the intense temperature of the furnace shall be reduced by the least possible amount by the putting in of any comparatively cold material. As soon as the whole charge has been fully melted a series of tests is begun, which, in general, consists of the taking of a sample of the metal with a small ladle and the casting of a small ingot or test piece. This is cooled and broken, and by the changing indication of the fracture, as the process advances in the furnace, an accurate knowledge of the exact condition of the melted mass is obtained.

"In general terms, it will be seen, as already noted, that the open-hearth process consists of the decarburization by an actual dilution of the mass, if the original bath has been made up of pig iron. The wrought-iron blooms often contain but traces of carbon, and the steel scrap only small percentages, varying usually from 0.2 to 0.5 of 1 per cent. of carbon. In some cases, in order to hasten the decarburization, iron ore of a suitable quality is thrown into the melted metal in the furnace. This acts by a combination of the oxygen which it contains with the carbon which still remains in the metal, thus causing a useful agitation in the bubbling or boiling by the evolution of carbonic oxide beneath the surface of the melted metal. The metallic iron thus reduced from the ore adds to the contents of the furnace, and the silicious and other earthy matter combines with the slag lying on the surface of the metal, which has been derived in large part from the slow wasting of the material of the walls and the bottom of the furnace itself. This reduction of the carbon continues until it stands at about 0.08 of 1 per cent., or less, in the contents of the furnace. A quantity of spiegel or ferro-manganese is then put in, usually preheated, and after stirring the metal, so that it shall be rendered as uniform as possible, the contents of the furnace are tapped out into a ladle at a breast which had been made up at the lowest point at one side of the sloping bottom of the furnace. In some cases the recarburizing material is thrown red hot into the ladle either before or during the pouring into it of the metal from the converter or the open-hearth furnace. From this ladle the metal is run into ingot molds by substantially the same means as are employed in the Bessemer process."

The open-hearth being the latest of the three great processes generally used in making steel, some uncertainty as to its *modus operandi* exists in the minds of those who use steel without having any special connection with its manufacture. The foregoing extract, and indeed the whole work, will be of much assistance to such persons.

#### Foreign Railroad Notes.

Barbed fence wire has invaded Germany, where it is advertised in railroad papers under the name of "Stahl-Stachelzaunraht," which certainly ought to keep the cattle off.

We have noted heretofore the provision of workmen's trains at very low rates in Saxony. The trains on one of the routes, between Dresden-Neustadt and Klotzsche, were withdrawn Jan. 16 for want of patronage. It is said that the workmen using it were mostly employed in the building trades, and had very little to do in the winter. Two other

workmen's trains, used chiefly by factory operatives, are said to have a satisfactory patronage.

Last year was one of exceptionally little railroad construction in Austria-Hungary. In Austria only 113½ miles of new road were opened, against 566 in 1884; in Hungary, 194 miles, against 211 in 1884. Twelve different lines were opened in Austria, varying in length from less than a mile to 28½ miles, and ten lines in Hungary, the longest of which was 62 and the shortest 1 mile. During the four years, 1881 to 1884, construction was very active in the two kingdoms, and 2,120 miles added to their systems.

The State Railroad Directory of the Berlin & Hamburg Railroad, one of the later acquisitions of Prussia, and a leading line, has recently begun to run its own sleeping cars over it, said to be extremely elegant. The distance is 178 miles, and the price of a berth for a first-class compartment is \$1.50; for a second-class the price is given, probably by a misprint, as \$1.62. When there is room enough, the holder of a first-class sleeping ticket while he given the whole of a second-class section (half-compartment), on condition that he uses but one of the berths. (It does not appear how one passenger can sleep in two berths). For three first-class sleeping-car tickets four passengers can have the whole of a compartment, with two berths on each side. "Children under four, sleeping with an adult, free." For two children, from four to ten, occupying one berth, one ticket is required. To secure a berth in advance at any state railroad station, 25 cents extra is charged for telegraphing.

Statistics of sickness among the employes of 26 railroad companies, mostly German, have been kept for several years, the whole number covered by the report being about 88,000. The number of cases of sickness per each 100 of each class of employes and of the whole number for three years has been:

	Locomotivemen.....	Trainmen.....	Trackmen.....	Stationmen.....	Others.....
1884.....	79	82	85	62	64
1885.....	62	64	63	34	37
1886.....	44	45	41	22	26
Total.....	47	49	47		

This, however, gives a false idea of the amount of sickness in the different classes, for the sickness lasted much longer in some cases than in others. The average number of days of illness in each case was:

	Loco. men.	Trainmen.	Trackmen.	Stationmen.	Others.
1884.....	16	20	24	22	24
1885.....	17	19	22	22	26

The trainmen are liable to exposure, which results in frequent cases of illness which do not last long, but the average number of days of illness per employe in 1884 was:

	Loco. men.	Trainmen.	Trackmen.	Stationmen.	Others.
1884.....	13.60	12.60	8.16	9.02	6.48

So though the average engineer or fireman was sick one-third oftener than the other trainmen, 2½ times as often as the trackmen and twice as often as the stationmen, he was sick but one-twelfth more than the other trainmen, and one-half more than the track and station men. The average duration of the illness (entitling to an allowance from a fund) for all classes of employes was 21 days in 1884 and 20 in 1885, and the entire 88,000 men lost 801,017 days by illness, an average of 9.1 days each.

The differences in the number of cases on different railroads are great, and also from year to year on the same railroad. In 1883 the Dutch Central, and in 1884 the lines worked by the Altona Directory, of the Prussian State Railroads, reported by 15 cases of sickness per 100 employes; against this in 1883 the Bohemian Northern had 71, and the lines worked by the Elberfeld Directory of the Prussian State Railroads 64 per 100; and the Alsace-Lorraine Railroads (now worked by the German Empire) had 63 cases per 100 in 1883, and only 39 in 1884.

Of the whole number of cases in 1884 13.83 per cent. were diseases of the blood, or general diseases, of which

	8.67 per cent. were rheumatism.
0.10 " " "	typhus.
0.21 " " "	diphtheria.
2.25 " " "	diseases of the nervous system.
1.17 " " "	eyes.
0.24 " " "	ears.
8.51 " " "	respiratory organs.
(0.36 " " "	consumption).
0.87 " " "	diseases of the circulatory system.
(0.32 " " "	heart).
11.49 " " "	digestive organs.
(5.61 of the stomach, 0.23 of the liver).	
0.55 per cent. were diseases of the bladder or generative organs.	
2.96 " " "	skin.
1.25 " " "	organs of locomotion.
3.32 " " "	injuries received in service.
0.50 " " "	out of service.

One case in 10,000 was feigned, and also one in 10,000 was a suicide. Of the latter there were 12 in 1884, and 29 in 1883—not common among railroad men here.

Of the whole number of employes 1.09 per cent. died in 1884, as also in 1883, the proportion of deaths being smallest among engineers and firemen and greatest among other trainmen and the unclassified employes. The lower death rate of locomotive men is very likely, because few old men continue in that branch of the service, but get less trying positions in station or other service, and so swell the death rate in that branch.

There is one European railroad company with a mileage nearly as great as the largest of ours, namely, the Paris, Lyons & Mediterranean, with 4,783 miles, and it has larger earnings than any American system worked under a single management, reporting for the last week of 1885 \$1,277,473 (against \$1,307,978 in 1884), and for the entire year \$61,427,366 in 1885, against \$63,632,263 in 1884, \$12,083 per mile. The largest earnings per mile in France are by the Northern (2,160 miles), namely, \$14,144 in 1885, and \$15,049 in 1884. These great systems, like ours, include some lines with



an immensely heavy traffic and others with very light business, usually embracing all lines in a given district, many of which the companies were required to build, as one of the conditions of their charters.

The Mont Cenis Railroad, which should have large earnings to pay interest, earned \$12,786 per mile in 1884, and \$11,069 in 1885. The French Algerian roads make a very poor showing indeed—\$1,132, \$1,358, \$2,037, \$3,055 per mile are some of their earnings, the lowest by a line 168 miles long. The French State Railroads, including 1,420 miles of exceptionally unproductive lines, earned \$3,281 per mile last year.

## General Railroad News.

### MEETINGS AND ANNOUNCEMENTS.

#### Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

*Housatonic*, annual meeting, at the office in Bridgeport, Conn., Feb. 26.

*Illinois Central*, annual meeting, at the office in Chicago, March 10.

*Philadelphia & Erie*, annual meeting, at the office in Philadelphia, Feb. 8.

*Missouri Pacific*, annual meeting, at the office in St. Louis, at 9 a. m., on March 9. Transfer books close Feb. 6.

*St. Louis & Cairo*, special meeting, to vote on the question of leasing the road to the Mobile & Ohio, in New York, March 15.

#### Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

*Chicago & Alton*, 2 per cent., quarterly, payable March 1, to stockholders of record on Feb. 13.

*Chicago & West Michigan*, 2 per cent., payable Feb. 15, to stockholders of record on Feb. 3. This company paid 3½ per cent. for 1884 and 2 per cent. for 1885.

*Connecticut & Pocomtuck Rivers*, 2½ per cent., semi-annual, payable Feb. 1.

*Detroit, Lansing & Northern*, 5 per cent., semi-annual, on the preferred stock, payable Feb. 15, to stockholders of record on Feb. 3. The August dividend was 2 per cent., making 7 per cent. paid for 1884.

*Maine Central*, 3 per cent., semi-annual, payable Feb. 15.

*Marquette, Houghton & Ontonagon*, 3 per cent., semi-annual, on the preferred stock, payable Feb. 15, to stockholders of record on Feb. 4. The August dividend was 2½ per cent.

*New York, Providence & Boston*, 2 per cent., quarterly, payable Feb. 10, to stockholders of record on Feb. 1.

#### Railroad and Technical Conventions.

Meeting and conventions of railroad associations and technical societies will be held as follows:

The *Western Association of General Passenger & Ticket Agents* will hold its annual meeting in Louisville, Ky., on Wednesday, Feb. 10.

The *American Institute of Mining Engineers* will hold its next meeting in Pittsburgh, beginning on Tuesday, Feb. 16.

The *National Association of General Passenger & Ticket Agents* will meet in Chicago, on Tuesday, March 16.

The *Southern Time Convention* will hold its spring meeting at the Grand Hotel in Cincinnati, on Wednesday, April 14.

The *General Time Convention* will hold its spring meeting at the Grand Hotel in Cincinnati, on Wednesday, April 14.

The *Master Car-Builders' Club* will hold its regular monthly meetings through the winter at the rooms, No. 113 Liberty street, New York, on the evening of the third Thursday in each month.

The *New England Railroad Club* will hold its monthly meetings at its rooms in the Boston & Albany passenger station in Boston, on the evening of the second Wednesday in each month.

The *Western Railway Club* will hold its regular monthly meetings at its rooms, No. 103 Adams street in Chicago, on the third Wednesday in each month.

#### Foreclosure Sales.

The sale of the *Danville, Olney & Ohio River* road, which was to have taken place Jan. 27, has been postponed by order of the court until Feb. 10. The postponement was made on petition of the Indianapolis Rolling Mill Co., which has a large claim for materials furnished the road.

The *Spring Grove, Avondale & Cincinnati* road was sold under foreclosure of mortgage in Cincinnati, Jan. 27. The railroad was bought for \$5,000, by George T. Harrison, representing the bondholders, most of whom are residents in Cincinnati. Some real estate not used for the road was sold for \$20,000 to Mr. James McCrea, representing the Pennsylvania Company. The road is a narrow gauge suburban line about 5 miles long, which was purchased by the Toledo, Cincinnati & St. Louis Co. at the same time that the company bought the Cincinnati Northern road, and was operated as the Avondale Branch of the Cincinnati Division.

The *Wabash, St. Louis & Pacific* road, a St. Louis dispatch says, will be sold April 24, the Master Commissioner having fixed that day for the sale.

The *Wheeling & Lake Erie* road will be sold under foreclosure March 31, under the decree lately granted by the United States Circuit Court. The court has fixed the minimum price at which the property can be sold at \$500,000.

### ELECTIONS AND APPOINTMENTS.

*Athol, Topeka & Santa Fe*.—The following official circulars have been issued:

"As Mr. A. A. Robinson, recently elected Second Vice-President, will, on and after Feb. 1, give attention chiefly to the Construction Department, the duties of General Manager will, on and after that date, be performed by the First Vice-President."

"Mr. D. J. Chase is appointed Superintendent of Transportation, in charge of the train and station service, with headquarters in General Office building, Topeka, appointment taking effect Feb. 1, on and after which date superintendents of divisions will report to the Superintendent of Transportation all matters pertaining to the train and station service. Mr. Chase, until further notice, will also continue to perform the duties of Superintendent of the Eastern Division."

"Mr. C. L. Nichols is appointed Assistant Superintendent of the Eastern Division, with headquarters at Topeka. Appointment taking effect as of date Feb. 1."

Mr. Don A. Sweet has been appointed Assistant Traffic Manager, with office in Topeka, Kan. He was recently on the Chesapeake & Ohio.

*Backman Valley*.—At the annual meeting, Feb. 1, the following officers were chosen: President, A. W. Eichel-

berger, Hanover, Pa. Directors, Jos. Althoff, C. W. Forney, J. W. Gitt, H. C. Shriver, Hanover, Pa.; Levi Dubbs, J. A. Klinefelter, Adam Newcomer, Glenville, Pa.; A. A. McHose, Columbia, Pa.; Jerome L. Boyer, Reading, Pa.; Samuel Thomas, Hokendauqua, Pa.; Percy R. Pyne, New York. Secretary and Treasurer, C. W. Forney.

*Berlin Branch*.—At the annual meeting at Abbotstown, Pa., Jan. 25, the following officers were elected: President, A. W. Eichelberger; directors, Wm. Bittinger, Wm. L. Hildebrand, Stephen Keefer, R. N. Meisenholder, Jacob Resser, Jacob M. Smyser, A. W. Storm, R. M. Wirt, Joseph Wolf; Secretary, A. W. Storm; Treasurer, Jacob Resser.

*Boston & Lowell*.—Mr. E. A. Nutting has been appointed Car Accountant upon this road. Car tracers, junction reports, and mileage reports should be addressed to him.

*Boston, Winthrop & Shore*.—At the annual meeting in Boston, Jan. 27, the following directors were chosen: John C. Abbott, Dudley H. Bradley, John H. Buttrick, Arthur McClellan, John W. Olmstead. The board elected John H. Buttrick President; A. D. McClellan, Clerk and Treasurer.

*Buffalo & Geneva*.—Mr. J. Imbrie Miller has been appointed Chief Engineer. He was recently on the South Pennsylvania road.

*Chautauqua Lake*.—Mr. W. J. Caton has been appointed General Passenger and Ticket Agent, with office at Jamestown, New York.

*Coudersport & Port Allegheny*.—The following officers were elected at the recent annual meeting in Allegheny, Pa.: F. W. Knox, President; C. S. Cary, Vice-President; A. B. Mann, Secretary; M. W. Barse, Treasurer; B. A. McClure, General Superintendent.

*Cresson, Clearfield & New York*.—At the annual meeting in Philadelphia, Jan. 29, the following directors were chosen: Edward R. Scull, Somerset, Pa.; John Dean, A. S. Merron, Hollidaysburg, Pa.; S. A. Atterbury, John H. Boyd, Edward F. Earle, George J. Gorman, Wm. R. Thompson, Peter J. Urling, Pittsburgh, Pa.; John S. Blaine, Charles E. Fugh, Philadelphia; John S. Silver, New York. The board elected S. A. Atterbury, President; John H. Boyd, Vice-President.

*Danville & New River*.—The present list of officers of this company is as follows: J. H. Rangely, President; C. W. Bayly, Superintendent and General Manager; G. K. Griggs, Secretary, Treasurer and Assistant Superintendent; J. A. Hall, Auditor; W. T. Whittaker, Master Mechanic; John T. King, Supervisor. Offices in Danville, Virginia.

*Denver & Rio Grande Western*.—The following circular has been issued by Receiver Bancroft: "A. L. Horner having resigned, the position of Assistant Superintendent is hereby abolished. T. J. Duddleson is appointed Trainmaster, and will have charge of trainmen and all matters pertaining to train service. Headquarters at Pleasant Valley Junction. B. G. Sargent is appointed Chief Dispatcher and Superintendent of Telegraph, and will have charge of operators and line repairers, and all Western Union accounts pertaining to this railroad. Headquarters at Pleasant Valley Junction."

*East Tennessee, Virginia & Georgia*.—Mr. J. H. Garner, Master of Trains of the Atlanta Division, and Mr. B. N. Rice, Master of Trains of the Brunswick Division, are appointed Acting Superintendents of those divisions in place of J. W. Fry, resigned.

*Florida Railway & Navigation Co.*—Mr. R. S. Lukenbill is appointed General Baggage Agent, with office in Jacksonville, Florida.

*Fonda, Johnstown & Gloversville*.—The present list of officers is as follows: W. J. Heacock, President; D. A. Wells, Vice-President; John McNab, Treasurer; L. Caten, Superintendent; M. F. Button, General Freight Agent. General offices, Gloversville, New York.

*Holyoke & Westfield*.—This company, whose road is leased to the New Haven & Northampton Co., last week elected these officers: President, J. C. Parsons; Vice-President, Timothy Merrick; Secretary, T. B. O'Donnell; Treasurer, G. W. Prentiss; Auditors, J. M. Clark, G. H. Hills, W. B. C. Pearsons; Directors, J. C. Parsons, W. B. C. Pearsons, Timothy Merrick, J. H. Newton, G. H. Hills, J. M. Clark, R. F. Kelton, A. H. Ryan, D. St. Marie.

*Housatonic*.—Mr. Henry A. Bishop is appointed Superintendent, with office in Bridgeport, Conn. He has been for some time General Freight and Passenger Agent of the Naugatuck Railroad.

*Huntington & Broad Top Mountain*.—At the annual meeting in Philadelphia, Feb. 2, the following officers were chosen: President, B. Andrews Knight; directors, Rathmell Wilson, John Devereux, I. V. Williamson, James Long, James Whitaker, William E. Jenks, C. W. Wharton, Thomas R. Patton, Jacob Naylor, Spencer M. Janney, William J. Barr, M. E. McDowell.

*Kanawha & Ohio*.—This company (formerly the River Division of the Ohio Central) has elected the following directors: P. W. Huntington, S. Churchill, H. D. Turney, A. M. McCracken and C. O. Hunter. The directors elected C. O. Hunter, President; H. D. Turney, Secretary and Treasurer.

*Kentucky Central*.—Mr. Henry E. Huntington has been appointed Receiver by the United States Circuit Court, on application of the trustees under the mortgage.

*Lehigh & Hudson River*.—Mr. E. M. Reynolds, having been appointed Auditor of this company in place of Mr. John Sayer, relieved by request, all communications pertaining to the Accounting Department should be addressed to Mr. Reynolds, at Warwick, New York.

*Montana Central*.—The incorporators of this new company are Charles A. Broadwater, Charles W. Cannon, Nicholas Kessler, William B. Raleigh, and Benjamin F. Potts, all of Helena, Montana.

*Natchez, Jackson & Columbus*.—At the annual meeting in Natchez, Miss., recently, the following directors were chosen: T. Otis Baker, L. Botto, George M. Brown, J. N. Carpenter, T. T. Hart, W. R. Kirby, George W. Kooztz, R. F. Learned, Will T. Martin, B. E. Orr, R. L. Saunders, J. C. Schwartz, James Sargent. The board re-elected Will T. Martin, President; B. E. Orr, Vice-President; J. M. Kearns, Secretary; George W. Kooztz, Treasurer.

*Newburg, Dutchess & Connecticut*.—At the annual meeting last week the following officers were re-elected: Gen. John S. Schultze, President and Treasurer; William A. Wells, Secretary; Charles L. Kimball, Superintendent.

*Newport News & Mississippi Valley Co.*—The following circular from the President, C. P. Huntington, is dated at No. 23 Broad Street, New York, Jan. 27:

"This company, having leased, from Feb. 1, 1886, the Elizabethtown, Lexington & Big Sandy Railroad, and the Chesapeake, Ohio & Southwestern Railroad, these properties

will be operated for the present under the titles of the *Eastern Division* and the *Western Division*, respectively.

"All matters pertaining to the operations of the leased properties lying east of Louisville, Ky., will be under the jurisdiction of the officers appointed for the Eastern Division, and those pertaining to the leased properties lying west of Louisville, Ky., will be under the officers of the Western Division."

"The business of the company will, under the direction of the President, be conducted by the following officers, they nominating to the President for confirmation the necessary officers for their respective departments:

"A First Vice-President, charged with the general supervision of matters pertaining to the financial affairs of the company, aiding the President in such other business as may be committed to him, and in his absence act for him. A Second Vice-President, charged with the general executive business and the operation of the leased properties of the Eastern Division. A Third Vice-President, charged with the general executive business and the operation of the leased properties of the Western Division. A Secretary and Treasurer, who shall have charge of all moneys and securities belonging to the company, and the general control of all matters relating to the disposition of the company's funds at the local offices. A General Counsel, charged with the general control of the company's legal matters. An Assistant to the President, to whom shall be assigned, in addition to such duties as may be from time to time entrusted to him by the President, the special duty of assisting the President in matters pertaining to the physical operations of the roads. A Controller, charged with the supervision and direction of all the accounts of the Company and the Accounting Department."

"In accordance with the above organization, the following appointments have been made: I. E. Gates, First Vice-President, New York; W. C. Wickham, Second Vice-President, Richmond, Va.; John Echols, Third Vice-President, Louisville, Ky.; I. E. Gates, Secretary and Treasurer, New York; Chas. H. Tweed, General Counsel, New York; Wm. Mahl, Assistant to the President and Controller, New York."

"All other officers and agents of the leased properties will be continued until further notice from the officers of their respective departments. Communications in respect to the several departments of the company should be addressed as above."

*New York, Lake Erie & Western*.—Mr. W. J. Murphy is relieved from the charge of the Rochester Division, but continues Superintendent of the Buffalo Division. Mr. G. W. Bartlett is appointed Superintendent of the Rochester Division, with office in Rochester, N. Y. Mr. Bartlett has been for five years past Roadmaster of the Delaware Division.

Mr. George H. Paine, late on the Lake Shore road, is appointed Roadmaster of the Delaware Division in place of Mr. Bartlett. Mr. W. H. Starr, late of the Buffalo Division, is appointed Roadmaster of the Eastern Division in place of R. F. Staats, resigned.

*New York, Ontario & Western*.—The following order from President T. P. Fowler is dated New York, Jan. 23: "Mr. J. E. Childs is appointed General Manager, with office at No. 15 Broad street, New York. To take effect Jan. 23."

Mr. Childs has been for some time past General Superintendent of the road.

*New York, Texas & Mexican*.—At the annual meeting in Victoria, Tex., Jan. 30, the following directors were elected: C. P. Huntington, Charles Crocker, A. C. Hutchinson, C. C. Gibbs, F. S. Stockdale, M. D. Monserrat, C. S. Wells. The following were elected officers: President, A. C. Hutchinson; Vice-President and General Superintendent, M. D. Monserrat; Treasurer, D. C. Proctor; Secretary, C. S. Wells.

*Oregon Pacific*.—The officers of this company are as follows: T. Egerton Hogg, President, New York; Wm. M. Hoag, First Vice-President and General Manager, San Francisco; G. T. M. Davis, Treasurer, New York; N. S. Bentley, Secretary, New York; Wallis Nash, Second Vice-President, Corvallis, Or.; H. V. Gates, Superintendent, Corvallis, Or.; C. C. Hogue, Comptroller, Corvallis, Or.; A. O. Eckelson, Division Engineer, Corvallis, Or.; General offices, Corvallis, Or., and 45 William street, New York.

*Pennsylvania*.—The following appointments and transfers are announced: A. P. Gest, Assistant Engineer New York Division, in place of Frank Ellmaker, recently promoted to be Superintendent Belvidere Division. Victor Wierman, Assistant Engineer Pittsburgh Division, in place of A. P. Gest, transferred. T. H. Dobson (late Supervisor Middle Division), Assistant Engineer West Pennsylvania Division, in place of Victor Wierman, transferred.

*Philadelphia & Reading*.—The board has elected President Franklin B. Gowen General Counsel also, in place of Mr. George R. Kaercher, resigned.

*Providence & Worcester*.—At the annual meeting in Providence, R. I., Feb. 1, the following directors were chosen: Wm. E. Chamberlain, Jonas G. Clark, Lyman A. Cook, John W. Danielson, Joseph G. Davis, Moses B. I. Goddard, Frederick Grinnell, Estus Lamb, Josiah Lasell, David K. Phillips, Oscar J. Rathbun, Gideon L. Spencer, Elijah B. Stoddard, Benjamin F. Thurston, Charles E. Whitin. This is the same board as last year.

*St. Louis, Arkansas & Texas*.—The incorporators of this company, successor to the Texas & St. Louis, are: Adolph Oppenheimer, S. R. Walling, J. M. Lemmon, G. T. Turner and H. R. Saddle of New York.

*St. Louis & Cairo*.—Mr. J. W. Fry is appointed General Superintendent of this road, which will shortly become the St. Louis Division of the Mobile & Ohio.

*Sinnemahoning Valley*.—The officers of this company are as follows: F. H. Goodyear, President; E. O. Cheney, Treasurer; C. D. R. Stowits, General Passenger and Freight Agent, with offices at Buffalo, N. Y. L. Taggart is Superintendent, with office at Keating Summit, Pa. His post-office address is Forest House, Pennsylvania.

*Southern Central*.—Mr. E. F. Swart is appointed Roadmaster of this road.

*Springfield & New London*.—This company, whose road is leased to the New York & New England, has re-elected the old officers and directors.

*West Shore*.—Mr. John Dick is appointed Roadmaster of the Hudson River Division. He has been for some time in charge of the line from Weehawken to Middletown for the New York, Ontario & Western.

### PERSONAL.

—Mr. A. H. Fatzinger, for several years past General Eastern Freight Agent of the Lehigh Valley Railroad, died at his residence in Newark, N. J., Jan. 28, aged 50 years.

—Major George H. Bardwell died very suddenly in Philadelphia, Jan. 23, of apoplexy. He was an extensive contractor and built a large part of the Shenandoah Valley and other Southern roads. At the time of his death he had a



large contract for the construction of some government works at Hot Springs, Ark.

—Mr. Thomas Leighton, one of the pioneer bridge builders of this country and among the first to enter into the business of building bridges on a large scale, died at his residence in Rochester, N. Y., Feb. 3. Mr. Leighton was for a number of years at the head of the well-known Rochester Bridge Works, but was compelled to retire a few years ago on account of failing health. A more extended notice will be found in another column.

—Mr. George H. Daniels, who, on Jan. 1 last, resigned his position as Commissioner of the Colorado and Utah Traffic Association to become Commissioner of the Central Passenger Committee, has issued a circular letter containing the resolutions passed by the managers of the Colorado and Utah Associations, and closing with the following acknowledgment of the same: "In retiring from a position which I have occupied for over three years, I wish to sincerely thank each of the officers and agents of the lines members of our various Associations for the many courtesies I have received at their hands, and to thank each and every one of the employees who have served under me for their careful, honest and intelligent services, and to bespeak for Mr. H. S. Rich, who has been with me during the whole of this time, the same kindly feeling which has always been extended to me."

## TRAFFIC AND EARNINGS.

### Railroad Earnings.

Earnings of railroad lines for various periods are reported as follows:

Month of January:				
	1886.	1885.	Inc. or Dec.	P. c.
Chi. & Alton.....	\$537,241	\$546,534	D. \$9,293	1.7
Chi. Mil. & St. P.....	1,445,000	1,577,397	D. 132,397	9.0
Denver & R. G.....	404,424	405,341	D. 917	0.2
Mil. L. S. & W.....	91,615	72,605	I. 19,010	26.3
Norfolk & Western.....	480,749	553,582	D. 72,833	15.1
St. L. & San F.....	282,400	315,900	D. 33,500	10.6
Third week in January:				
Bur. C. R. & No.....	\$43,925	\$43,496	I. \$429	1.0
C. I. St. L. & C.....	42,849	47,996	D. 5,147	10.7
Flint & Pere M.....	32,610	30,492	I. 2,118	6.9
Illinois Central.....	202,800	206,510	D. 3,710	1.8
Iowa lines.....	25,200	22,970	I. 2,230	9.7
Long Island.....	36,514	36,730	D. 216	0.5
Norfolk & West.....	52,055	58,094	D. 6,039	10.4
St. P. & Duluth.....	12,969	18,780	D. 5,811	30.6
Year to Dec. 31:				
Chi. & W. Mich.....	\$1,297,301	\$1,468,667	D. \$172,366	11.7
Del. Lacka & W.....	348,788	468,977	D. 120,189	25.2
Net earnings.....	31,091,677	31,312,902	D. 221,225	0.7
Net earnings.....	7,871,105	8,303,445	D. 432,340	5.5
Det. La. & No.....	1,284,471	1,328,501	D. 44,030	3.4
Net earnings.....	457,200	463,321	D. 6,121	1.4
Ill. Central:				
Ill. lines.....	6,508,112	6,158,312	I. 349,800	5.7
South. Div.....	4,434,816	4,340,131	I. 94,685	2.2
Iowa lines.....	1,078,336	1,173,391	D. 94,055	8.7
Louisv. & Nashv.....	13,071,323	13,062,475	I. 8,848	0.1
Net earnings.....	5,330,290	5,372,635	D. 42,345	0.8
Mem. & Charles.....	1,39,848	1,428,682	D. 28,834	6.2
Net earnings.....	301,365	398,196	D. 96,831	24.2
Mobile & Ohio.....	2,057,381	2,160,412	D. 103,031	4.8
Net earnings.....	524,677	599,901	D. 75,224	12.5
Natchez, J. & Col.....	194,358	181,860	I. 12,498	6.9
Net earnings.....	60,923	60,907	I. 16	0.0
N. Y. L. E. & W.....	16,045,370	16,541,370	D. 496,000	3.0
N. Y. & N. England.....	3,116,033	2,945,917	I. 170,116	5.8
Net earnings.....	1,093,887	947,074	I. 146,813	15.5
N. Y. P. & Ohio.....	5,167,175	5,021,336	D. 145,839	2.8
Norfolk & West.....	2,771,121	2,711,153	I. 59,968	2.2
Net earnings.....	1,121,819	1,194,295	D. 72,476	6.1
Ohio & Miss.....	3,079,619	3,702,939	D. 623,320	17.0
Net earnings.....	1,094,069	1,094,069	I. 0	0.0
West Jersey.....	1,286,011	1,319,648	D. 33,637	2.5
Net earnings.....	476,617	503,305	D. 26,688	5.3
Eleven months to Nov. 30:				
Cl. C. C. & I.....	\$3,323,751	\$3,486,617	D. \$162,866	4.0
Net earnings.....	859,867	942,604	D. 82,737	8.8
Month of November:				
Cl. C. C. & I.....	\$329,395	\$326,301	I. \$3,094	0.9
Net earnings.....	113,051	111,060	I. 1,991	1.8
Month of December:				
Buff. N. Y. & P.....	\$204,516	\$179,291	I. \$25,225	14.1
Net earnings.....	58,316	44,325	I. 13,991	31.8
Louisv. & Nashv.....	1,033,318	1,022,127	D. 11,191	1.1
Net earnings.....	473,410	606,749	D. 133,339	28.0
Mem. & Charles.....	158,933	174,633	D. 15,700	9.9
Net earnings.....	59,697	69,924	D. 10,227	17.1
Mobile & Ohio.....	282,577	284,637	D. 2,060	0.7
Net earnings.....	152,339	145,917	I. 6,422	4.4
N. Y. L. E. & W.....	1,505,885	1,262,720	I. 243,165	19.2
Net earnings.....	491,587	335,014	I. 156,573	46.7
N. Y. & N. England.....	371,043	299,049	I. 71,994	24.1
Net earnings.....	96,410	51,020	I. 45,390	89.0
N. Y. P. & Ohio.....	539,709	452,419	I. 87,290	19.3
Net earnings.....	196,478	160,113	I. 36,365	22.7
Norfolk & West.....	249,432	247,103	I. 2,329	0.9
Net earnings.....	109,849	115,615	D. 5,766	4.6
Ohio & Miss.....	312,044	283,078	I. 28,966	10.2
Net earnings.....	95,117	45,006	I. 50,111	112.2
West Jersey.....	86,868	83,131	I. 3,737	4.3
Net earnings.....	14,533	2,847	I. 11,686	417.0

Weekly earnings are usually estimated in part, and are subject to correction by later statements. The same remark applies to early statements of monthly earnings.

### Cotton.

Cotton movement for the five months of the crop year from Sept. 1 to Jan. 29 is given by the *Commercial and Financial Chronicle* as below, in bales:

Interior markets:				
	1885-86.	1884-85.	Inc. or Dec.	P. c.
Receipts.....	2,725,387	2,296,049	I. 429,338	18.7
Shipments.....	2,265,895	2,032,392	I. 233,503	11.5
Stock, Jan. 29.....	476,342	280,872	I. 195,470	69.5
Seaports:				
Receipts.....	4,113,246	4,126,092	D. 12,846	0.3
Exports.....	2,510,372	2,813,341	D. 302,969	10.8
Stock, Jan. 29.....	1,803,239	885,457	I. 1,917,782	22.3
A considerable part of the shipments from interior markets reappears in the receipts at the seaports.				
The <i>Chronicle</i> says: "In the table below we give the receipts from plantations, and add to them the net overland movement to Jan. 1, and also the takings by Southern spinners to the same date, so as to give substantially the amount of cotton now in sight."				
	1885-86.	1884-85.	1883-84.	1882-83.
Receipts at the ports to Jan. 29.....	4,113,246	4,126,092	3,981,316	4,319,947
Interior stocks on Jan. 29 in excess of Sept. 1.....	460,492	263,657	250,508	331,038
Total receipts from plantations.....	4,573,738	4,390,049	4,231,914	4,650,985
Net overland to Jan. 1.....	525,092	358,048	382,415	413,082
Southern consumption to Jan. 1.....	131,000	115,000	123,000	130,000
Tot. in sight Jan. 29.....	5,229,830	4,863,097	4,737,329	5,194,067
North'n spinners' takings to Jan. 29.....	1,151,099	889,880	975,791	1,085,631

It will be seen by the above that the increase in amount in sight Jan. 29, as compared with last year, is 386,133

bales, the increase as compared with 1883-84 is 492,501 bales, and the increase over 1882-83 is 35,763 bales."

### Coal.

Coal tonnages for the week ending Jan. 23 are reported as follows:

	1886.	1885.	Inc. or Dec.	P. c.
Anthracite.....	618,224	329,383	I. 288,841	96.8
Eastern bituminous.....	151,761	137,117	I. 14,644	10.7
Coke.....	61,800	37,203	I. 24,597	66.5

The anthracite market is unsettled, and prices are reported very low. The failure to make any agreement for the current year makes it very uncertain what the policy of the companies will be.

An effort is being made to secure some agreement among the several lines concerned in the bituminous trade to tide-water.

St. Louis coal receipts in 1885 were 53,387,064 bushels, against 52,349,000 in 1884 and 50,687,225 in 1883. The increase last year over 1884 was 2 per cent., and over 1883 it was 5.3 per cent.

Coal shipments from Sydney and North Sydney, Cape Breton, last year were 296,413 tons, against 312,140 in 1884; a decrease of 15,927 tons, or 5 per cent.

Cumberland coal shipments for the month ending Jan. 30 are reported by the *Cumberland Chronicle* as follows:

	1886.	1885.	Inc. or Dec.	P. c.
Baltimore & Ohio R. R.....	136,566	138,303	D. 1,737	1.3
Bedford Div., Pa. R. R.....	21,447	11,202	I. 10,245	91.5
Total.....	158,013	149,505	I. 8,508	5.7

Shipments from mines for the month were: Cumberland & Pennsylvania Railroad, 103,356; George's Creek & Cumberland, 37,136; West Virginia Central & Pittsburgh, 17,521; total, 158,013 tons. Local deliveries are included in the Baltimore & Ohio tonnage.

The anthracite coal tonnage passing over the Shamokin Division, Northern Central road, for the month ending Jan. 30 was, this year, 67,078; last year, 59,903; increase, 7,175 tons, or 12 per cent.

Actual tonnage passing over the Huntingdon & Broad Top Mountain road for the month ending Jan. 30 was:

	1886.	1885.	Increase.	P. c.
Broad Top coal.....	20,082	12,571	7,511	59.6
Cumberland coal.....	21,387	12,409	8,978	72.4
Total.....	41,469	24,980	16,489	66.0

The Broad Top coal is mined on the line; the Cumberland is carried through for the Pennsylvania Railroad.

The Beech Creek, Clearfield & Southwestern road carried in January this year 75,346 tons; last year, 48,152; increase, 27,194 tons, or 56.5 per cent.

The coal tonnage of the Pennsylvania Railroad Division of the Pennsylvania Railroad for the month ending Jan. 30 was:

	1886.	1885.	Increase.	P. c.
Coal.....	899,074	781,589	117,485	14.3
Coke.....	218,498	179,396	39,102	21.8
Total.....	1,117,572	960,985	156,587	15.7

This includes all tonnage passing over the road, whether mined on the line or received from other roads.

### Georgia Railroad Commission.

The Georgia Railroad Commission recently heard argument on the complaint submitted by John N. Dunn and Aaron Haas, acting for the Atlanta Chamber of Commerce, against the Southern Railway & Steamship Association, complainants, charging that the pooling contract of that association was contrary to the laws of Georgia and consequently void so far as it might relate to the points in that state. The decision is a long and elaborate one, and is to the effect that the matter is beyond the jurisdiction of the Commission. The Commission therefore declines to pass upon the question as to whether the right of the railroads to pool their business is prohibited or interfered with by the constitution or laws of the state. This decision is signed by Commissioners Erwin and Trammell. Major Wallace, the third member of the Commission, dissents from the conclusions of his colleagues, and holds that the agreement is contrary to law, being a contract for the proportionment of tonnage and division of earnings, thereby lessening competition and violating the provision of the state constitution.

### St. Louis Freight Traffic.

The *St. Louis Republican* of Jan. 30 says: "According to a statement issued by Secretary Morgan the total amount of freight received at St. Louis by railroad and river last year was 7,249,239 tons, against 6,961,137 tons for 1884. The shipments were 4,071,308 tons, against 4,126,329 tons in 1884 and 4,145,556 tons in 1883. The following table of receipts shows which roads have gained and which have lost in the struggle for the traffic of the city. The falling off of 50 per cent. in the Missouri Pacific haul in two years is somewhat remarkable:

Route.	1885.	1884.	1883.
M. P. (main line).....	548,779	631,553	1,692,591
St. L. & S. F.....	311,394	382,597	329,856
W. St. L. & P. (West branch).....	322,02	304,885	429,494
C. & A. (Mo. Div.).....	85,020	108,522	135,688
St. L. I. M. & S.....	692,506	677,216	694,382
M. P. (Texas Div.).....	220,729	227,709	227,805
Cairo Short Line.....	546,458	528,478	532,758
L. & N.....	406,165	373,820	373,155
St. L. & C.....	122,379	80,001	176,461
O. & N.....	460,415	345,652	426,582
C. & A. (main line).....	329,435	282,327	184,223
I. & St. L.....	394,989	374,483	376,328
Vandalia Line.....	761,944	686,469	745,044
W. St. L. & P. (Eastern Div.).....	698,887	830,755	632,655
T. C. & St. L.....	26,399	18,746	14,277
I. & St. L.....	281,989	230,874	242,826
W. St. L. & P. (Iowa Branch).....	20,178	5,879	6,753
C. B. & Q.....	376,116	236,744	236,584
St. L. R. & N.....	117,105	122,137	117,511
Upper Mississippi.....	117,445	129,895	126,330
Lower Mississippi.....	116,050	143,495	262,210
Illinois River.....	84,830	110,455	94,205
Missouri River.....	16,875	28,525	33,770
Ohio River.....	133,595	98,980	155,095
Cumberland & Tenn. Rivers.....	9,370	8,590	17,615

Total in tons..... 7,243,233 6,961,137 7,569,948  
Total by rail..... 6,764,168 6,440,787 6,940,723  
Total by river..... 479,065 520,350 629,225

"In addition to the receipts by Upper Mississippi and by Missouri boats, 254,000 tons of lumber, logs and shingles were received by raft.

"The receipts of coal were 53,387,064 bushels last year, 52,349,000 in 1884 and 50,687,225 in 1883. In addition to this 3,000,000 bushels of coke were received. The consumption of anthracite coal in 1880 was 40,000 tons; last year it was double that amount."

### Southern Passenger Committee.

The Southern Passenger Committee met at the office of the Commissioner, in Atlanta, Ga., Jan. 27, a large part of the members being in attendance. The session continued for two days, and its proceedings included a general discussion of the question of passenger rates. No decision was reached as to the making of rates to points beyond the limits of the territory covered by the committee. This matter was left

with the Commissioner, who is charged with the duty of making a rate sheet in connection with the agents of the outside lines.

Special rates were granted in a number of cases for various meetings and excursions. The Seaboard Air Line applied for membership, and it was ordered that it should be received upon signing the agreement. The meeting adjourned subject to the call of the Commissioner.

### Lake Superior Iron Ore.

The *Marquette Mining Journal* gives in a recent issue an elaborate table showing the shipments of iron ore from each mine in the Lake Superior region from its opening up to the close of 1885. The total shipments for eight years past have been:

	Tons.	1881.....	Tons.
1885.....	2,427,437	1880.....	2,295,618
1884.....	2,518,048	1879.....	1,885,724
1883.....	2,352,288	1878.....	1,574,863
1882.....	2,947,392	1877.....	1,101,110

The total shipments from 1854, when ore was first sent out, to Dec. 31, 1885, were 27,375,339 tons. Four mines have shipped over 2,000,000 tons each: Lake Superior, 3,594,600; Cleveland, 3,243,729; Jackson, 2,508,435; Republic, 2,296,006. The first shipments were 3,000 tons from the Cleveland mine in 1854.

### West Shore Immigrant Rates.

In announcing its adhesion to the trunk line agreement and its membership in the new immigrant clearing house, the West Shore Railroad Co., through its General Agent, gives notice that its special immigrant agency has been



servant injured was not aware of the incompetency and carelessness of the one causing the injury.

4. A servant is not bound to jeopardize his safety to obey the order of a master. If he does, after having time to deliberate as to his peril, and is injured, he is guilty of contributory negligence.

5. Whether one act of negligence is sufficient to establish incompetency, or not, depends upon the character of the act. It may be such as per se to prove incompetency.

6. Evidence that one heard the superintendent of a railroad company told that a certain employe was incompetent is admissible as showing that the superintendent had knowledge of such fact, if the fact itself had been otherwise proved; but such evidence would be inadmissible to prove the fact.

7. Where it is sought to charge a company for negligence of a fellow-servant or for the negligence of the company itself, or of a vice-principal, the causes of action should be stated in separate counts. Reversed.

#### State Right to Condemn Land from United States Land Grants.

In Chicago, Jan. 29, Judge Gresham, in the United States Circuit Court, dismissed the chancery case of the Illinois Central Railroad Co. against the Chicago, Burlington & Northern Railroad Co., in which the former company sought to enjoin the latter from attempting to condemn for railroad purposes part of the complainants' right of way between Portage Curve and East Dubuque. The Illinois Central obtained the right of way in question from the state, under a Congressional act of 1850, granting lands to Illinois to aid in the construction of railroads. The company claimed that this Congressional act became a substantial part of its charter; that the lands it took were charged with a public trust, and were, therefore, protected against the state's right of eminent domain, under which the Chicago, Burlington & Northern was seeking condemnation of the desired lands. Judge Gresham, in deciding the case, said: "The position of the Illinois Central is not tenable. The United States has parted absolutely with its title to these lands. It has no more interest in them than it had in any other land which it has disposed of. Lands owned by the United States within a state, and not held for public or governmental purposes, are subject to the state right of eminent domain and taxation, the same as lands owned and held by individuals. It is only such land as the United States holds and owns within the states, and upon which it maintains public buildings, arsenals, forts, etc., that is exempt from state authority and taxation. The United States does not own or hold the right of way in question in any sense, and it certainly has no such interest in the right of way as denies the state the right to take it for public uses. It will be observed that the United States is not complaining of the proposed action on the part of the state. It is the Illinois Central Co., a creature of the state, which denies the right of the state to exercise the asserted authority over the right of way. The corporation acquired its right of way directly from the state. It is responsible to the state, and not to the United States."

#### OLD AND NEW ROADS.

**Artesia, Starkville & Grenada.**—The engineers have completed the survey of this projected line from Artesia, Miss., through Starkville to Grenada, and report that they have found a practicable route which can be built at a moderate amount.

**Atlantic, Greenville & Western.**—Several of the towns along the line have already voted subscriptions in aid of the construction of this projected road, which is to run from Greenville, S. C., to Ninety-six, and thence to some point on the coast. The engineers are now at work locating the line, and have nearly completed the first section of 25 miles from Greenville.

**Boston & Lowell.**—This company will ask the Massachusetts Legislature for leave to connect the Mystic Branch with the Salem & Lowell branch by the construction of a line from Charlestown, through Everett, Revere and Lynn to Peabody. This branch will be about 12 miles long and, in connection with the existing lines, will make a new route from Boston to Salem 14½ miles long. It will enter directly the territory of the Boston & Maine, and its construction will be a reprisal for the lease of the Worcester, Nashua & Rochester road, by which the Boston & Maine entered into territory heretofore occupied by the Boston & Lowell and other roads.

**Boston, Winthrop & Shore.**—This company has passed under the control of the Boston, Revere Beach & Lynn, that company having purchased a majority of the stock and a large part of the bonds. It is understood that the stock was bought at about \$3 and the bonds at about 70. The Boston, Winthrop & Shore operates a short line extending through the town of Winthrop to Point Shirley and Crescent Beach. It is chiefly supported by suburban and summer pleasure travel, and its traffic will be a valuable feeder to the Boston, Revere Beach & Lynn. It is doubtless to prevent perversion to the Eastern road that caused the purchase of the controlling interest.

**Buffalo, New York & Philadelphia.**—The statement to the New York Commission for the quarter ending Dec. 31 is as follows:

	1885.	1884.	Inc. or Dec.	P. c.
Earnings .....	\$656,208	\$609,929	I. \$46,279	7.6
Expenses .....	478,597	437,506	I. 40,941	9.4
Net earnings .....	\$177,701	\$172,363	I. \$5,338	3.1
Other income .....	44,663	—	I. 44,663	—
Total .....	\$222,364	\$172,363	I. \$50,001	29.1
Charges .....	222,746	284,462	D. 61,716	21.7
Deficit .....	\$382	\$112,099	D. \$111,717	99.7

Interest is charged in 1885 as it would accrue under the plan of adjustment submitted to the bondholders.

**Canton & Waynesburg.**—This road is now completed to Summit, O., 5 miles beyond the late terminus at Marks and 12 miles from the starting point at Canton. Trains are running to the new terminus.

**Central, of New Jersey.**—Mr. George M. Dallas, the Special Master in the case of the contested lease of this road by the Reading, filed his report in the office of the Clerk of the United States Circuit Court Jan. 30 his recommendations against the latter corporation. All of the questions raised on both sides are discussed at length, and the Master finds, after giving facts and figures, that the Reading is in default on account of arrears in rent to the amount of \$545,000. The Master then says:

"The Reading Co. has appeared and answered, but has not made out a case entitling it to have the Court retain possession for its benefit. It has broken its covenant by failing to pay the rent due Dec. 1, 1884, and 60 days' notice thereof having been given to it pursuant to the 15th section of the lease, and no compensation having been made therefor, the petitioner became entitled, as against it, to exercise the option of declaring the lease terminated; and is now entitled, in equity, to the exercise of that right, subject to the reservations and exceptions of the 15th section, and upon equitable terms and conditions, such as will be hereafter recommended. But apart from the provisions of the 15th section, the Read-

ing Co. is certainly not in a position to ask a court of equity to hold this property upon its behalf, for it has failed to pay rent in arrears, and makes no tender of it, or any provision for that which shall hereafter accrue.

"The Receivers have possession of the property under lease, the covenants of which they have not kept and cannot keep. The matter is growing worse every day. Large sums are due for rental, which have not been paid, and there can be no assurance that as more shall accrue it will be discharged. The lessor never agreed to part with its property, except upon the condition that it should have the right to resume the possession of it if the rental should not be paid as covenanted, and its punctual payment must, in view of the contemplated application of it, have been considered as of especial moment.

"Under the circumstances a court of equity would not restrain the lessor from moving upon proper times and conditions to repossess itself of the demised premises. The lease requires that the lessor's approval must be obtained before it can be required to issue stock or bonds on account of extensions or improvements, and this stipulation has not been complied with. The lessee's disregard of this provision, however, was acquiesced in by the lessor.

"At all events, a decree such as is now asked should not be granted, except upon the condition that compensation shall be made for all the additions, extensions or improvements which have been in good faith added to the property; and, indeed, by the 15th section, the right of the lessee, before re-entry, to repayment of all advances made by it for improvements is expressly saved and excepted.

"The petitioner should, I think, be required to forego all right to sue, at law or in equity, for recovery of compensation for damages alleged by reason of the breach of any covenant or covenants on the part of the lessee, or for any other cause, matter or thing arising under this lease, or by reason thereof. The decree should include an order that all matters in dispute between the parties (being essentially matters of account) shall be adjusted and determined in this present proceeding, and in substantially the same manner as accounts are ordinarily settled and adjudged in equity.

"If any such reference as has been indicated shall be ordered it should be proceeded with as speedily as possible, and I recommend that the final decree should await the coming in of the report, the demised premises and property to remain, in the meantime, in the possession of the Receivers, and be operated by them in conformity with the order of April 10, 1885."

The Court has not yet taken any action on the Master's report.

In Trenton, N. J., Feb. 2, Chancellor Runyon decided that the lease of the Central Railroad of New Jersey to the Philadelphia & Reading Railroad should be terminated. The suit was brought by Alfred Mills and John H. Lidgerwood, Executors of the will of Stephen Vail, against the Central Railroad Co., the Philadelphia & Reading Co., and the persons who, at the time of filing the bill, Aug. 29, 1883, were the directors of the latter company. The object was to annul the lease made in May, 1883, by the Central to the Reading, by which the former was leased to the latter for a term of 999 years. The complainants held 2,048 shares, and began suit in equity to break the lease. The question involved was whether the Central had the right to make the lease without the consent of those stockholders, and whether or not they were estopped from action in equity.

The Chancellor discusses the matter at great length, and holds that the complainants are entitled to relief in equity, as there is no evidence of their acquiescence in the lease. The rights of minority stockholders to a voice in an action vitally affecting their rights is strongly upheld by the Chancellor in an elaborate argument. "It is," he says, "for the Legislature to say whether the stock of the minority in such a case as this shall be taken, as for a public use, under the exercise of the right of eminent domain. It has not said that it may be so taken. Parties who, in such a matter as this, act with full knowledge that the minority do not acquiesce, do so at their peril, and must take the consequences of the undoing of their act if the other party has been reasonably prompt to take the requisite measures for redress. There will be a decree declaring the lease and transfer of property thereby made null and void."

**Chicago, Burlington & Northern.**—In Chicago, Jan. 29, the United States Circuit Court dismissed the suit brought by the Illinois Central Co., to enjoin the construction of this new road on the line parallel to the Illinois Central tracks between Portage and East Dubuque. In order to build this line the new road sought to condemn part of the Illinois Central right of way, and that company asked for an injunction on the ground that it received the right of way in question under the act of Congress granting lands to aid in the construction of the road, and that it was therefore protected against condemnation under the authority of the state, under which the Chicago, Burlington & Northern Co. acts. The court held that this position was not tenable, and that the lands in question could be condemned under the law.

This company issues this notice to subscribers: "Owing to the unusually favorable season, it has been possible to push the construction of the road more rapidly than was anticipated. Your directors, therefore, have decided to allow payments to be made in advance, with an allowance of interest at the rate of 4 per cent. per annum.

"Subscribers are now given the option of paying up any or all of the remaining installments, due April 1, July 1 and Nov. 1. If payments be made in full, the undelivered portion of the bonds and stocks will be deliverable at the time of payment. Upon partial payments, bonds will be deliverable for the equivalent, as near as may be of the total payments, less \$100 per block, to be held in reserve. If bonds or stock are not ready upon payment, they will be delivered as soon as they can be prepared. The company reserves the right to discontinue the privilege of prepaying, at any time it may think fit, without further notice."

**Chicago, Burlington & Quincy.**—An Omaha dispatch reports that this company has just let contracts for the following branches of its Nebraska line: Hastings to Aurora, 26 miles; Omaha stock yards to Ashland, 26 miles; Edgar to Blue Hill, 28 miles; a total of 80 miles. The company had previously let contracts for branches from Tobias, through Edgar to Superior, 59 miles; from Fairmont south 15 miles; from Elwood northwest 48 miles; and from Grand Island southwest 100 miles, making in all 297 miles of branches to be added to the Nebraska lines this year.

It is stated that this company is acquiring additional right of way along the line for the purpose of building a third track on the 40 miles from Chicago to Aurora.

**Chicago & West Michigan.**—The following statement is published for the year ending Dec. 31:

	1885.	1884.	Inc. or Dec.	P. c.
Earnings .....	\$1,297,301	\$1,469,667	D. \$172,366	11.7
Expenses .....	948,613	1,000,690	D. 52,177	5.2
Net earnings .....	\$348,788	\$468,977	D. \$120,089	25.6
Interest .....	220,008	219,869	I. 139	0.1
Surplus .....	\$128,780	\$249,108	D. \$120,328	48.3

From last year's surplus a dividend of 3 per cent. has been declared, which will require \$129,004, leaving a balance of \$5,776. For 1884 the company paid 8½¢ and for 1883 it paid 2 per cent.

**Cincinnati, Hamilton & Dayton.**—It is again reported that negotiations are in progress for a sale of this company's Cincinnati, Richmond & Chicago and Cincinnati, Hamilton & Indianapolis lines to the Pennsylvania Co., but nothing definite is made public.

**Cincinnati, Wabash & Michigan.**—It is understood that negotiations are in progress for a sale of this road to a syndicate of Canadian capitalists, whose representatives recently made an inspection of the road. The line is now owned chiefly in Cleveland. It is said that the price asked is \$2,500,000. It extends from Benton Harbor, Mich., southward to Anderson, Ind., 165 miles, and the purchasers intend, if the bargain is concluded, to extend the road southward to some point on the Ohio river.

**Cleveland, Columbus, Cincinnati & Indianapolis.**—The company's statement for November and the eleven months to Nov. 30 is as follows:

	—November—	1884.	1885.	1884.
Earnings .....	\$329,395	\$326,301	\$3,323,751	\$3,486,017
Expenses .....	215,743	215,240	2,463,884	2,544,013

Net earnings .. \$113,652 \$111,061 \$859,867 \$942,004  
For the eleven months in 1885 interest, taxes, etc., amounted to \$781,000, and payments for additions to property were \$155,026, showing an excess of payments over receipts of \$76,159. The decrease in gross earnings was \$162,866, or 4.7 per cent.; in net earnings, \$82,737, or 8.8 per cent.

**Cresson, Clearfield & New York.**—The last rail was laid Jan. 28 on this road, which extends from Cresson Springs, Pa., on the Pennsylvania Railroad, to Irvonia, in Clearfield County, a distance of 30 miles. The road runs through some large tracts of timber and also through some valuable coal lands, and is intended to run northward to a connection with the Beach Creek, Clearfield & Southwestern road. At Irvonia it connects with the Bell's Gap Railroad.

**De Land & Atlantic.**—This road has been completed and is now in operation from De Land Junction, Fla., on the Jacksonville, Tampa & Key West road, to Lake Helen, a distance of 8 miles.

**Detroit, Lansing & Northern.**—The following statement is made for the year ending Dec. 31:

	1885.	1884.	Inc. or Dec.	P. c.
Earnings .....	\$1,228,471	\$1,328,591	D. \$100,120	7.5
Expenses .....	771,271	865,270	D. 93,999	10.9
Net earnings .....	\$457,200	\$463,321	D. \$6,131	1.3
Interest paid .....	267,019	263,893	I. 3,126	0.4
Surplus .....	190,181	\$197,428	D. \$7,247	3.7

Dividends amounting to 7 per cent. on the preferred stock have been declared, requiring \$175,700, and leaving a balance of \$14,481. All renewals and improvements were charged to expenses for the year.

**East Tennessee, Virginia & Georgia.**—The holders of consolidated bonds have agreed upon a reorganization committee that has consented to serve. It consists of Robert Fleming, as representative of the foreign holders; Charles M. McGhee, President of the Memphis & Charleston road; George Warren Smith, of Kountze Brothers, New York; Frederic D. Tappen, President of the Gallatin National Bank; E. W. Corlies, Vice-President of the Bank of America, and Frederick P. Olcott, President of the Central Trust Co., which is trustee of the mortgages of the company.

**Evansville & Terre Haute.**—The following circular was recently issued by General Passenger Agent G. J. Grammer: "Taking effect Jan. 1, 1886, the Terre Haute & Southern Railroad, Terre Haute to Worthington; the Evansville, Washington & Brazil Railroad, Worthington to Washington; the Evansville & Indianapolis Railroad, Evansville to Washington, will be consolidated under the name of the Evansville & Indianapolis Railroad, forming a through line from Evansville to Terre Haute, a distance of 138 miles. The consolidated road will be operated by this company. Passenger trains will arrive and depart from the union depot, at both Evansville and Terre Haute, and from the joint depot with the Indianapolis & Vincennes Railroad Co., at Worthington."

The Evansville & Terre Haute Co. therefore operates a double line between Terre Haute and Evansville. The new line, however, is, except for a short distance from the terminal points, at some distance from the old one, and does not compete for local business.

**Illinois Central.**—This company makes the following statement of gross earnings for the year ending Dec. 31:

			Average of 7 years, 1878-84.
In Illinois .....	\$6,508,112	\$6,158,312	\$6,334,283
Southern Division .....	4,434,816	4,320,131	3,780,061
Total lines owned .....	\$10,942,928	\$10,478,443	\$10,114,374
Leased lines in Iowa:			
Dubuque & Sioux City .....	911,630	924,347	1,024,812
Iowa Falls & Sioux City .....	626,579	662,642	616,677
Cedar Falls & Minn. ....	140,177	125,402	126,640
Total, Iowa Div. ....	\$1,678,336	\$1,712,391	\$1,767,529
Total, all lines .....	\$12,621,264	\$12,190,834	\$11,881,903

The lines owned showed last year an increase of \$464,485, or 4.4 per cent., and the Iowa leased lines a decrease of \$34,055, or 2.0 per cent., the total gross earnings thus showing a gain of \$430,430, or 3.5 per cent.

It will be noted that the decrease on the Iowa Division is on the main line, the greater part of it on the western half of that line. The Cedar Falls & Minnesota branch line, which has always had light earnings, showed an increase of 12 per cent. last year, and its earnings are considerably above the average of the seven years before 1884.

**Jacksonville, Tampa & Key West.**—The extension of the main line is now completed to Enterprise, Fla., 15.6 miles beyond the late terminus at De Land Junction, 68.1 miles from Palatka and 124 miles from Jacksonville. With its Indian River line this gives the company a through all-rail line from Jacksonville to Titusville, 160 miles in length. This company now operates 196.05 miles of road, as follows: The Northern Division, from Jacksonville to Palatka, 55.75 miles; the Southern Division, from Palatka to Enterprise, 68.10 miles; the Indian River Division, from Enterprise to Titusville, 36 miles, and the St. Augustine Division, from Jacksonville to St. Augustine, 86.20 miles.

**Kentucky Central.**—In Louisville, Ky., Jan. 29, application was made to the United States Circuit Court for the foreclosure of the first mortgage upon this road. The application was made by William Bliss and Isaac E. Gates, trustees under the mortgage, the complaint alleging 6 months' interest as now overdue, and that there are also unpaid taxes and other liens. The trustees also asked for the appointment of a receiver, pending further proceedings, and the court granted the application, appointing Mr. Henry E. Huntington, a nephew of Mr. C. F. Huntington, to that position. These proceedings are probably preliminary to the re-organ-



ization of the company, with a decreased funded debt, the present amount of the debt being greater than the road is able to pay from its earnings.

**Louisville, Evansville & St. Louis.**—The Receiver's report for December shows total receipts, including a balance of \$49,262, amounting to \$143,091. The disbursements for the month were \$88,204, leaving a balance of \$54,867 on hand at the close of the month.

**Louisville & Nashville.**—Notice is given that this company will purchase the whole or any part of \$850,000 Louisville city 6 per cent. bonds, maturing as follows: \$446,000, due April 1, 1886; \$206,000, due Oct. 1, 1886, and \$198,000, due April 1, 1887, at par and accrued interest to date of delivery, and a further sum equal to 2 per cent. per annum to date of maturity.

**Long Island.**—This company's statement to the Railroad Commission for the quarter ending Dec. 31 is as follows:

	1885.	1884.	Increase.	P. c.
Earnings.....	\$615,061	\$567,645	\$47,416	8.3
Expenses.....	362,655	373,176	10,521	5.2
Net earnings.....	\$252,406	\$194,469	\$57,937	14.4
Other income.....	22,998	16,913	6,085	35.8
Total.....	\$275,404	\$211,382	\$64,022	16.1
Interest, etc.....	158,233	149,611	8,622	5.7
Surplus.....	\$87,171	\$61,771	\$25,400	41.0

The usual quarterly dividend of 1 per cent. was paid for the quarter in each year.

**Mason City & Fort Dodge.**—It is proposed to build a railroad from Fort Dodge, Ia., northeast to Mason City, a distance of about 70 miles. A further extension from Mason City to Winona, Minn., is also proposed.

**Memphis & Charleston.**—The gross and net earnings for December and for six months from July 1 have been:

	December.	1884.	1885.	1884.
Gross earnings.....	\$158,933	\$174,633	\$728,524	\$773,581
Operating expenses.....	99,236	107,709	477,966	544,510
Net earnings.....	\$59,697	\$66,924	\$250,558	\$229,071

For the half-year the gross earnings decreased \$45,057, or 5.8 per cent., and the expenses \$66,544, or 12.2 per cent., leaving a gain of \$21,487, or 9.4 per cent., in net earnings.

**Memphis & Little Rock.**—It is reported that the holders of the majority of the first mortgage bonds, who have all along opposed the management of the company, have sold their bonds to parties connected with the Gould interest, which will hereafter completely control the road.

**Memphis, Selma & Brunswick.**—At the rehearing before the United States Circuit Court the order for the appointment of a receiver was, on the showing made by complainant in the original and amended bills and without argument, dissolved, the Court holding that no sufficient cause had been shown for such action. The road will consequently remain in possession of the Memphis, Birmingham & Atlantic Co., which recently acquired possession by purchase from the former owners.

**Mexican Railroad Notes.**—The following notes are from the *Mexican Financier* of Jan 23:

Work on the section of the National road from Morelia to Patzcuaro is advancing rapidly.

Work is progressing on the railroad from Cárdenas to Rio Grifalva, in the state of Tabasco.

A railroad is projected in Michoacan to unite the district of Tacambaro with Morelia, and to pass through Uruapan, Teretan and Ario. Such a road would open up a very rich district, one of the most productive in the country.

A society has been organized at Guadalajara for the purpose of securing the opening of a port which shall be of utility to the mercantile community of the state of Jalisco. The port selected is the roadstead of Peñitas on the ensenada of Los Tomates or Valle de Banderas. The climate of Peñitas is said to be excellent and the place free from insects. The distance from Peñitas to Guadalajara is estimated at 300 kilometers. Peñitas is between—almost half way—San Blas and Manzanillo. It is advocated in Guadalajara that the Central Railroad should change its Pacific coast terminus from San Blas to Peñitas. The Central Railroad Co. has already spent over \$1,000,000 at San Blas and would probably have to see very good reasons before consenting to change. But if Peñitas is destined to be the chief port of the important state of Jalisco, it might be advisable, even at some loss, to make that port the Pacific terminus of the railroad.

**Mobile & Ohio.**—The gross and net earnings for December, and from July 1 to Dec. 31, have been:

	December.	1884.	1885.	1884.
Earnings.....	\$282,577	\$284,637	\$1,140,384	\$1,184,027
Expenses.....	130,238	138,720	740,212	782,236
Net earnings.....	\$152,339	\$145,917	\$400,172	\$401,791

For the half-year the gross earnings show a decrease of \$43,643, or 3.7 per cent., and the expenses a decrease of \$42,024, or 5.4 per cent., the result being a decrease of \$1,619, or 0.4 per cent., in net earnings.

**Montana Central.**—This company has filed articles of incorporation to build a railroad from Helena, Mont., through Rimini to Marysville, reaching several important mining districts. The incorporators are all citizens of Helena.

**Newport News & Mississippi Valley Co.**—A circular from this company announces that it has leased from Feb. 1 the Elizabethtown, Lexington & Big Sandy and the Chesapeake, Ohio & Southwestern roads, and those properties will be operated for the present under the title of the Eastern and the Western divisions, respectively.

The leases of the Chesapeake & Ohio and the Louisville, New Orleans & Texas roads will be concluded as soon as the necessary formalities can be gone through with.

**New York, Chicago & St. Louis.**—In the Court of Common Pleas in Cleveland, O., Jan. 28, the Central Trust Co., of New York, as trustee under the first mortgage, filed an amendment and supplement to its answer already made in the suits against the company. The amended petition alleges that the company is insolvent and that the holders of one-half the outstanding bonds have joined in a declaration to the effect that the company having defaulted for more than three months on the interest of the principal of the bonds has become due and they have joined in a request to the trustee to enforce their rights. The trustee is therefore asked that the mortgage may be foreclosed and the road sold to satisfy the claims of the bondholders.

**New York, Lake Erie & Western.**—It is stated that contracts have been prepared for the building of a new passenger station and ferry-house in Jersey City, to replace the present very shabby temporary structure, which has long been insufficient for the business, and was, indeed, never fit to be used as the terminal station of a road with the business of the Erie. Work, it is said, will be begun very shortly. The station new will be raised 4 ft. above the level of the present

building, in order to avoid the trouble which has been experienced nearly every winter from high tides, the water having been several times over a foot deep on the floor of the present waiting room. The new station will have sufficient accommodations for a large business, and the train house will be longer than the sheds now in use, so as to give room for the longest passenger train likely to come into the station. The ferry house will be larger than the present one, giving room for several additional slips.

This company's statement for December and the three months of the fiscal year from Oct. 1 to Dec. 31 is as follows, the figures including 68 per cent. of the gross earnings and all the working expenses of the leased New York, Pennsylvania & Ohio road:

	December.	1884.	1885.	1884.
Earnings.....	\$1,872,887	\$1,570,385	\$5,766,061	\$5,141,580
Expenses.....	1,357,527	1,230,042	3,966,318	3,675,570
Net earnings.....	\$515,360	\$350,343	\$1,799,743	\$1,466,010

For the three months this shows an increase in gross earnings of \$624,481, or 12.1 per cent.; an increase in expenses of \$290,748, or 7.9 per cent., and an increase in net earnings of \$333,733, or 22.8 per cent.

The earnings of the Erie line proper, excluding all earnings and expenses of the New York, Pennsylvania & Ohio road, were:

	December.	1884.	1885.	1884.
Earnings.....	\$1,505,885	\$1,262,720	\$4,700,314	\$4,145,397
Expenses.....	1,014,298	927,706	2,943,477	2,779,484
Net earnings.....	\$491,587	\$335,014	\$1,756,837	\$1,365,913

For the three months this shows an increase in gross earnings of \$554,917, or 13.4 per cent.; an increase in expenses of \$163,993, or 5.9 per cent., and an increase in net earnings of \$390,924, or 28.6 per cent.

A comparison of the two statements shows that for the three months of 1885 the 68 per cent. of the gross earnings of the New York, Pennsylvania & Ohio road amounted to \$1,065,747, and the working expenses to \$1,022,841, leaving a profit of \$42,906 on the lease for the quarter, against a similar profit of \$100,097 for the quarter in 1884.

**New York & New England.**—It is stated that the offer to purchase the stock of the old Boston, Hartford & Erie Co. at \$6 per share has been accepted by holders of 105,000 shares, leaving 41,000 shares which have not yet come in. A meeting of holders who have deposited their shares under the proposed agreement will be held shortly. It is expected that the balance of the stock will come in before long. The offer to buy, it is understood, was made by parties interested in the New York & New England Co. with the view of putting an end to pending litigation over the title to the road.

A protest has been filed with the Massachusetts Legislature by Cyrus W. Field and associates against the action of the Governor and Council in rejecting their bid for the second mortgage bonds sold by the State a short time ago.

This company's statement for December and the three months of the fiscal year from Oct. 1 to Dec. 31 is as follows:

	December.	1884.	1885.	1884.
Earnings.....	\$311,016	\$239,049	\$690,724	\$800,204
Expenses.....	214,606	188,029	579,406	575,170
Net earnings.....	\$96,410	\$51,020	\$311,318	\$225,034

For the three months the gross earnings increased \$160,520 or 20.1 per cent., and the expenses \$4,236, or 0.7 per cent., leaving a gain of \$156,284, or 69.4 per cent., in net earnings.

As noted more in detail elsewhere, the New York, New Haven & Hartford Co. has rejected decisively a proposition made by this company to lease its road on terms which in substance amount to the payment of the net earnings as rental, with a guarantee that they shall equal the fixed charges. The rejection, it is understood, was so positive that it is not likely that the negotiations will be renewed, at present at any rate.

**New York, New Haven & Hartford.**—At a meeting of the board held in New York, Feb. 1, Mr. C. P. Clark, who is a director of this company, and also President of the New York & New England Co., laid before the board a proposition for the lease of that road. The proposition was that the New Haven Co. lease the New England road, guaranteeing the fixed charges and agreeing to pay such dividends on the preferred and common stock as the earnings may warrant; the lessee to agree also to send all the through business it could over the leased road, diverting as much as possible from the Boston & Albany and the Shore Line. The proposition was also that the lease be for a long term of years.

This proposition was discussed at much length and finally rejected by a decided majority. It is said that the discussion brought out a strong opposition to a lease of the New England road on any terms, this opposition being much more decided than had been expected.

**Ohio & Mississippi.**—This company's statement for December and the year ending Dec. 31 is as follows:

	December.	1884.	1885.	1884.
Earnings.....	\$312,804	\$283,076	\$3,679,613	\$3,702,959
Expenses.....	217,787	240,070	2,644,644	2,926,733
Net earnings.....	\$95,017	\$43,006	\$1,034,969	\$776,226
Per cent. of exps.....	69.6	84.4	71.9	79.0

For the year the gross earnings decreased \$23,346, or 0.6 per cent., and the expenses \$282,089, or 9.6 per cent., the result being a gain of \$258,743, or 33.4 per cent. in net earnings.

**Pennsylvania.**—Work is to be pushed this spring on this company's new Long Beach road, running from Whiting Junction, N. J., through Tuckerton to Mannahawken, thence across Barnegat Bay on a trestle bridge about 3 miles long, and southward along the beach to Beach Haven and points below. This road will be another link in the line which the company expects to have along the New Jersey sea coast all the way from Long Branch to Cape May, and it will not require many more miles for its completion.

**Philadelphia & Reading.**—The engine house at the Mahanoy Plane was destroyed by fire on the night of Jan. 30, completely wrecking the large engines and other machinery used to work the plane. Nearly all the coal from the North Schuylkill fields passed over this plane, and until the machinery can be replaced, which work it is said will take nearly a year, the coal from that district must be sent over the Broad Mountain by way of Gordon Plane & Tamagua, entailing much additional expense in transportation. The origin of the fire is unknown.

The Special Master to whom was referred the suit to set aside the New Jersey Central lease, has reported to the Court in favor of restoring that road to the Central Co., as noted more fully elsewhere.

The Receiver's statement for December, the first month of the fiscal year, gives the earnings of the railroad as follows:

	1885.	1884.	Increase.	P. c.
Earnings.....	\$2,592,529	\$2,315,563	\$276,966	11.9
Expenses.....	1,408,127	1,394,552	13,575	0.8
Net earnings.....	\$1,184,402	\$921,011	\$263,391	28.8

The earnings show a remarkable improvement, chiefly owing to a largely increased coal trade for the month.

The statement for the Philadelphia & Reading Coal & Iron Co. is as follows:

	1885.	1884.	Increase.	P. c.
Earnings.....	\$1,345,258	\$1,074,822	\$270,436	25.2
Expenses.....	1,420,827	1,124,376	296,451	26.4
Deficit.....	\$75,569	\$40,554	\$35,015	52.4

While the coal trade increased, low prices seem to have made the gain a source of loss instead of profit.

The joint net result for both companies was as follows:

	1885.	1884.	Increase.	P. c.
Net earnings, Railroad Co.....	\$1,186,402	\$921,011	\$265,391	28.8
Deficit, Coal & Iron Co.....	75,569	40,554	35,015	52.4
Total net.....	\$1,110,833	\$871,457	\$239,376	27.5

The expenses as given above contain nothing for interest or rentals, the net earnings being the amount from which those charges are to be made.

The Receivers have ordered the payment of the rentals of the collateral lines accruing in February, including the North Pennsylvania and the Delaware & Bound Brook railroads. The Receivers are now transmitting the net earnings of the Central Railroad of New Jersey to that company's New York office at the rate of \$5,000 per day.

The decision of the Chancellor of New Jersey pronouncing the Central Railroad lease invalid is noted more fully elsewhere. No action has been taken or order made in enforcement of this decision as yet, but the expected result is an order returning the Central road to the possession of the Receiver. An appeal may possibly be taken from the Chancellor's decision.

**Philadelphia, Wilmington & Baltimore.**—The earnings for the year ending Oct. 31 are reported as follows:

	1884-85.	1883-84.	Inc. or Dec.	P. c.
Earnings.....	\$5,678,588	\$5,820,223	D. \$141,735	2.4
Expenses.....	3,889,772	3,965,145	D. 75,373	1.9

Net earnings..... \$1,788,816 \$1,855,178 D. \$66,362 3.6

Per cent. of exps..... 68.5 68.1 I. 0.4

This statement includes all branches and leased lines worked by the company.

**Rochester & Pittsburgh.**—The Supreme Court at Rochester, N. Y., has given a decision denying an application made by the Union Trust Co., trustee, to amend the decree of sale to require a further deed of assurance to Adrian Iselin, the purchaser of the road at the sale made under foreclosure of the second mortgage. The court holds that, the old company having been enjoined in a suit begun in Pennsylvania from making any transfer of the property, on the ground that the sale and conveyance by the Referee of the New York court was insufficient to pass the title to the road in Pennsylvania, it cannot under these circumstances require the company to execute any further deed or conveyance pending the proceedings in Pennsylvania. At the same time the Court refused a motion to vacate the foreclosure sale, and granted a motion to confirm the report of the sale by the Referee.

**St. Louis, Arkansas & Texas.**—This company has filed articles of incorporation in Texas, the capital stock being fixed at \$9,550,000. The organization is formed by the bondholders who recently bought the Texas & St. Louis road at foreclosure sale, and is intended to cover the line of that road in Texas. The incorporators are the committee representing the bondholders.

**St. Louis Coal Railroad.**—The United States Circuit Court has authorized the Receiver to make contracts with the Railroad Equipment Co. of New York for the purchase of certain equipments, to be paid for in installments from the earnings of the road.

**St. Louis, Kansas City & Colorado.**—This projected line is to run from St. Louis, nearly due west to a point in Bates County, Mo., and thence through Southern Kansas, nearly parallel to the Atchison, Topeka & Santa Fe, to Trinidad, Col. A branch to Kansas City is also proposed. The company has done no work on its line as yet, but has recorded a mortgage for \$20,000,000 on its proposed road.

**St. Paul & Northern Pacific.**—The St. Paul Pioneer-Press of Jan. 30 says: "Track laying on the St. Paul & Northern Pacific interurban line was completed a day or two ago, and connection made with the company's yard tracks. Work upon the Westminster street tunnel has not been finished, but it is sufficiently advanced to permit of the passage of trains. In fact, the company's engines and express trains are now passing through the tunnel and running between the two cities. The Minneapolis & St. Louis, which will operate the new line, under a lease from the St. Paul & Northern Pacific, will begin running its freight trains to St. Paul next week. Passenger trains will not be run into St. Paul for a week or two, and local trains between the two cities will not be put on for some little time."

The length of the new line from Minneapolis to St. Paul is 11½ miles, and about 6 miles of the track were laid last year.

**Shreveport & Houston.**—The connection between this road, which forms the Louisiana end of the Houston, East & West Texas road, and the Texas line, was completed on Jan. 26, when the first train passed over the Sabine River at Logansport on a temporary bridge. This temporary structure will serve to pass trains for the present, and will also be used in the construction of the permanent iron bridge. The whole length of the line from Houston, Tex., to Shreveport, La., is 232 miles, and it will be operated as one line, although under distinct organizations in Texas and Louisiana.

**Southern Pacific Co.**—The stock of this company is for an authorized issue of \$100,000,000, of which \$88,076,200 has been issued and will be listed at the Stock Exchange as soon as the engraved certificates are ready. The Union Trust Co. is the registrar and the trustee for holding in trust all the stocks owned by the Southern Pacific Co. The statement made to the Stock Exchange contained the following:

"The company has purchased and now owns the following Railroad stocks and bonds:

Name of corporation.	Par value.	Tot. stock of Co.
Southern Pacific California.....	\$43,300,050	\$44,039,100
" " Arizona.....	19,992,600	19,995,000
" " New Mexico.....	6,688,800	6,688,800
Morgan's La. & Texas Co.....	3,985,900	5,000,000
Gal., Har. & San Antonio.....	25,780,400	27,085,100
Texas & New Orleans.....	4,972,500	5,000,000
Louisiana Western.....	3,310,000	3,300,000
Mexican International.....	4,104,100	4,922,100
Total stock.....	\$112,264,350	\$116,290,100

Gal., Har. & San Ant. W. Div. 6 per cent. bonds..... 1,110,000

Total stocks and bonds.....\$113,374,350

"This company has issued no bonds, and has incurred no debts or obligations beyond the current monthly pay rolls and supply bills and its obligations under leases."

A considerable force is now employed in the extension of the Central Pacific's Oregon Division northward. It is understood that this force will soon be largely increased, and contracts will be let for several of the tunnels required.



**Southern Change of Gauge.**—It has been understood for some time that nearly all the more important Southern lines, including the Louisville & Nashville, the Nashville, Chattanooga & St. Louis, the Western & Atlantic, and the Central Railroad of Georgia, were making arrangements to change their gauges from 5 ft. to the Northern standard of 4 ft. 8½ in. A meeting of general managers is to be held in Atlanta, Ga., Feb. 6, for the purpose of taking concerted action in relation to the proposed changes, so that the different lines can work together and the change can be effected with the least possible delay and inconvenience to traffic. At this meeting it is expected that the date on which each road will change will be definitely agreed upon.

**Tionesta Valley.**—This road has been extended from the former terminus at Auguston, Pa., southward 4 miles to Duhring, making the entire length of the line 17 miles.

**Toledo, Cincinnati & St. Louis.**—The latest report concerning this road is that the committee of bondholders who purchased it at the foreclosure sale are negotiating for a sale of the property to a New York syndicate which is acting in the interest of the New York, Chicago & St. Louis Co., and which will, if the sale is concluded, change the line to standard gauge and make it the St. Louis Division of the Nickel Plate line. Nothing definite can, however, be ascertained regarding the reported negotiation.

**Union Pacific.**—This company offers to purchase up to Feb. 10, 1886, any or all of the outstanding land grant bonds of the several issues at the following prices: Bonds due April 1, 1887, at 106.10 flat; bonds due Oct. 1, 1888, 110.96 flat; and the bonds due April 1, 1889, 112.55 flat. The company has also notified the Stock Exchange that the following amounts of bonds were outstanding Dec. 31, 1885: Kansas Pacific consols, \$14,905,000; Denver extensions, \$6,259,000, and Union Pacific land grants, \$2,706,000. There are \$509,000 Denver extensions in the sinking fund. Kansas Pacific consols Nos. 1 to 16,430 are a good delivery. The difference, \$1,525,000, have been bought by trustees on account of land sales.

**Western North Carolina.**—Surveys are being made for an extension of this road from Murphy, N. C., the terminus of the western branch, westward to Cleveland, Tenn., on the East Tennessee, Virginia & Georgia, and thence to Dayton, Tenn., on the Cincinnati Southern.

It is understood that work is to be pushed this year on the extension of the road to Murphy, with a view of completing that line as soon as possible.

**West Jersey.**—This company's statement for December and the year ending Dec. 31 is as follows:

	December 1885.	1884.	Year 1885.	1884.
Earnings.....	\$86,864	\$83,131	\$1,286,011	\$1,319,648
Expenses.....	72,331	70,284	809,394	816,343
Net earnings.....	\$14,533	\$12,847	\$476,617	\$503,305
Interest, rentals, etc.....			290,198	290,395
Net balance.....			\$186,419	\$203,390

For the year the gross earnings decreased \$33,636, or 2.5 per cent., and the expenses \$6,949, or 0.9 per cent., leaving a decrease in net earnings of \$26,688, or 5.3 per cent. There was a decrease in the fixed charges of \$9,177, or 3.1 per cent., the result being a decrease of \$17,511, or 8.6 per cent., in net income.

The earnings of the leased West Jersey & Atlantic road (included above) for the year were \$185,058, the expenses \$113,303 and the net earnings \$71,755. The decrease in gross earnings was \$18,229, or 9.0 per cent., and in net earnings \$11,531, or 13.9 per cent.

**Wisconsin Central.**—A dispatch from Milwaukee says: "Track laying on the Wisconsin Central's Chicago line going South is completed to Mukwonago. Work on the south end coming north from the Chicago city limits is progressing favorably, and the track will be complete before March 1, unless very unfavorably weather sets in. The officials say they will be running into Chicago before June 1 if they are able to secure from the government the old Bridwell lot for depot purposes. The Wisconsin Central Co. expects to build up a very large suburban passenger traffic. The road runs through Desplaines, through River Forest, through Oak Park (about a mile from the centre of the village), and through River Park. Desplaines and River Forest are already important suburbs, and it will take but a short time for River Park and the new addition of Oak Park to build up and become large towns, as they are very convenient to the city."

**Wisconsin, Pittsville & Superior.**—Work on this road has been resumed, and a considerable force is now employed clearing the right of way and preparing for the grading of the extension from Pittsville, Wis., to Marshfield, 25 miles. Grading will shortly be begun on a section of 14 miles.

#### ANNUAL REPORTS.

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#### Norfolk & Western.

The following statement is made by this company for the year ending Dec. 31, in advance of the publication of the full report.

The earnings for the year were as follows:

	1885.	1884.	Inc. or Dec.	P. c.
Passenger trains.....	\$579,769	\$645,902	D. \$66,133	10.2
Freight.....	2,191,352	2,065,351	I. 126,001	6.1
Total.....	\$2,771,121	\$2,711,158	I. \$59,968	2.2
Expenses.....	1,649,292	1,516,858	I. 132,434	8.7
Net earnings.....	\$1,121,829	\$1,194,295	D. \$72,466	6.0
Gross earn. per mile.....	5,412	5,390	I. 22	0.4
Net.....	2,191	2,374	D. 183	7.6
Per cent. of expenses.....	60	56	I. 4	

Passenger train earnings include mail and express. Taxes are included in expenses.

The traffic for the year was as follows:

	1885.	1884.	Inc. or Dec.	P. c.
Rev. train miles.....	2,679,875	2,324,546	I. 355,329	15.0
Pass. carried.....	368,123	412,452	D. 44,329	6.0
Passenger-miles.....	19,152,091	19,213,251	D. 60,560	0.3
Tons freight carried.....	1,199,302	792,512	I. 406,790	51.3
Ton-miles.....	295,790,230	171,773,275	I. 124,016,955	72.0

Local business last year furnished 79.7 per cent. of the passenger miles and 72.9 per cent. of the ton-miles, against

88.6 and 55.5 per cent. in 1884. But while the increase in local ton-mileage last year was 126 per cent., the earnings on local freight increased only 18 per cent. The increase in freight was chiefly in coal and other heavy freight carried at low rates.

#### Natchez, Jackson & Columbus.

This company owns a line, of 3 ft. 6 in. gauge, from Natchez, Miss., to Columbus, 100 miles. The statements below are from the reports presented at the annual meeting in Natchez for the year ending Dec. 31.

The earnings for the year were as follows:

	1885.	1884.	Inc. or Dec.	P. c.
Freight.....	\$130,551	\$115,927	I. \$14,624	12.6
Passage.....	51,905	55,187	D. 3,282	5.9
Mail, etc.....	11,903	10,740	I. 1,163	10.8
Total.....	\$194,358	\$181,860	I. \$12,498	6.9
Expenses.....	133,433	122,943	I. 10,490	8.5
Net earnings.....	\$60,925	\$58,917	I. \$2,008	3.4
Gross earn. per mile.....	1,944	1,819	I. 125	6.9
Net.....	609	589	I. 20	3.4
Per cent. of exps.....	68.7	67.6	I. 1.1	

There was a considerable increase in freight business, but a loss in passenger earnings last year.

#### Wilmington, Columbia & Augusta.

This company owns a line from Wilmington, N. C., to Columbia, S. C., 189 miles. The road is leased to the Wilmington & Weldon Co., but its operations are reported separately. The report is for the year ending Sept. 30 last.

The equipment consists of 29 locomotives; 18 passenger, 6 postal and 5 baggage and express cars; 351 box, 4 refrigerator, 6 stock, 178 flat and 16 caboose cars. Two locomotives and 2 passenger cars were added last year.

The general account is as follows, condensed:

Capital stock.....	\$960,000
Funded debt.....	1,000,000
Accounts and balances.....	92,041
Profit and loss.....	241,881
Total.....	\$2,293,922
Road and equipment.....	\$2,569,060
Stocks and bonds.....	89,895
Accounts and balances.....	91,289
Cash.....	143,878
Total.....	\$2,893,922

The funded debt consists of a single issue of \$1,600,000 first mortgage 6s, due 1910.

The earnings for the year were as follows:

	1884-85.	1883-84.	Inc. or Dec.	P. c.
Freight.....	\$367,990	\$370,236	D. \$2,246	0.6
Passage.....	204,750	195,945	I. 8,805	4.5
Mail, etc.....	90,053	80,889	I. 9,164	14.2
Total.....	\$672,793	\$647,070	I. \$25,723	3.9
Expenses.....	455,405	455,384	I. 21	0.0
Net earnings.....	\$217,388	\$191,686	I. \$25,702	13.4
Gross earn. per mile.....	3,554	3,454	I. 100	2.9
Net.....	1,145	1,045	I. 100	9.5
Per cent. of expense.....	67.8	69.7	D. 1.9	

Renewals last year included 23.23 miles of steel rails, 69,014 new ties and 19.51 miles of track ballasted. The drawspan at the Pee Dee River was replaced by a new one.

The result of the year was as follows:

Net earnings, as above.....	\$217,388
Interest on bonds.....	\$66,000
Deficit on Central R. R. lease.....	1,597
Dividends, 6 per cent.....	57,000
Total.....	\$157,791

Balance, surplus for the year.....	\$61,191
Interest, dividends, etc., received.....	26,146
Balance, assets, Oct. 1, 1884.....	188,596
Total.....	\$275,933

A new contract has been made with the Southern Express Co., which is expected to increase the express receipts considerably hereafter.

The traffic for the year was as follows:

	1884-85.	1883-84.	Inc. or Dec.	P. c.
Train miles.....	337,619	320,633	I. 16,986	5.3
Freight.....	238,341	228,562	I. 9,779	4.3
Service and switch.....	88,498	93,860	D. 5,362	5.7
Total.....	665,458	643,055	I. 22,403	3.5
Passengers carried.....	145,777	133,274	I. 12,503	9.4
Passenger-miles.....	7,035,368	6,480,226	I. 555,142	8.6
Tons freight carried.....	183,214	170,400	I. 12,814	7.7
Ton-miles.....	18,353,646	16,235,961	I. 2,117,685	13.0

Through business last year furnished 68.4 per cent. of the passenger-miles, the increase being 21 per cent.

Preparations are in progress to change the gauge of the road from 5 ft. to the standard 4 ft. 8½ in., and the change will probably be made next summer.

The Central Railroad of South Carolina, which is leased jointly by this company and the Northeastern Co., earned last year \$85,532. The expenses were \$57,717, leaving the net earnings \$27,815. The rental is \$31,000, leaving a deficit for the year of \$3,185, half of which is borne by the Northeastern and half by this company.

#### Cheshire.

This company owns a line from Bellows Falls, Vt., to South Ashburnham, Mass., 53½ miles. It leases the use of the Fitchburg tracks from South Ashburnham to Fitchburg, 10½ miles. It also leases the Monadnock road, from Peterboro, N. H., to Windchendon, Mass., 16 miles, making 80 miles worked. The report is for the year ending Sept. 30.

The equipment includes 31 locomotives; 26 passenger and 11 baggage cars; 453 freight and 32 service cars.

The general balance sheet is as follows:

Common or old stock.....	\$53,300
Preferred stock.....	2,100,000
Funded debt.....	800,000
Accounts and balances.....	80,495
Profit and loss.....	65,591
Total.....	\$3,099,386
Road and property.....	\$2,717,535
Cash and cash assets.....	381,851
Total.....	\$3,099,386

There was no change in stock or bonds during the year. The bonds are plain bonds, bearing 6 per cent. interest.

The traffic for the year was as follows:

	1884-85.	1883-84.	Inc. or Dec.	P. c.
Passengers carried.....	164,092	161,373	I. 2,719	4.6
Passenger-miles.....	4,880,153	4,908,226	D. 28,073	0.6
Tons freight carried.....	501,320	523,588	D. 22,268	4.2
Ton-miles.....	27,541,921	28,970,669	D. 1,428,748	4.9
Per passenger-mile.....	3.00 cts.	3.14 cts.	D. 0.14 ct.	4.5
Per ton-mile.....	1.33 "	1.38 "	D. 0.05 "	3.9

The average rate on through freight last year was 1.28

and on local 5.00 cents per ton-mile. The greater part of the traffic is through freight.

The earnings for the year were as follows:

	1884-85.	1883-84.	Inc. or Dec.	P. c.
Earnings.....	\$561,204	\$586,685	D. \$25,481	4.3
Expenses.....	747,347	405,909	D. 341,438	14.4
Net earnings.....	\$213,857	\$180,776	I. \$33,081	18.3
Gross earn. per mile.....	7,015	7,334	D. 319	4.3
Net.....	2,073	2,260	D. 187	8.3
Per cent. of expenses.....	61.9	69.2	D. 7.3	

Payments from net earnings were, for rentals, \$57,446; interest, \$48,000; dividends, \$63,000; a total of \$168,446, leaving surplus of \$45,411 for the year. The dividends were 3 per cent. on the preferred stock.

#### Delaware, Lackawanna & Western.

The following preliminary statement for the year ending Dec. 31 has been issued, in advance of the annual report for the year.

The income statement is as follows, including all operations of the company:

	1885.	1884.	Inc. or Dec.	P. c.
Earnings.....	\$31,091,677	\$31,311,992	D. \$220,315	0.7
Expenses.....	23,220,572	23,008,147	I. 212,425	0.9
Net earnings.....	\$7,871,105	\$8,303,845	D. \$432,740	5.2
Int. and rentals.....	5,187,089	5,113,322	I. 73,767	1.4
New con. and equip't.....	443,182	385,093	I. 58,089	15.1
Total.....	\$5,630,271	\$5,498,355	I. \$131,916	2.4
Net income.....	\$2,240,834	\$2,805,490	D. \$564,656	20.1
Dividends paid.....	1,063,000	2,096,000	D. 1,033,000	6.3
Surplus.....	\$275,834	\$709,490	D. \$433,656	61.1

The dividends paid were 7½ per cent. in 1885 and 8 per cent. in 1884. The net income as given above was 8.5 per cent. on the stock, against 10.70 in 1884.

The stock remains unchanged at \$26,200,000. The bonded debt was reduced \$370,900 during the year, by the redemption of maturing bonds.

#### Wilmington & Weldon.

This company owns a line from Weldon, N. C., to Wilmington, 161½ miles, with branches from Rocky Mount to Tarboro, 17½ miles, and from Halifax to Scotland Neck, 19 miles, making 198 miles in all. The 50th annual report is for the year ending Sept. 30 last.

The company also leases the Wilmington, Columbia & Augusta road, from Wilmington to Columbia, S. C., 189 miles. The earnings of that line are reported separately and not included in the figures given below.

The equipment includes 31 locomotives; 14 passenger, 6 combination, 4 postal and 4 baggage and express cars; 245 box, 10 stock, 138 flat and 16 caboose cars; 1 officers' and 1 pay car, 1 wrecking and 2 bridge cars.

Work has been begun on a branch from Contentnea to Fayetteville, N. C., which is hereafter to be extended to Florence, S. C.

The general account is as follows, condensed:

Capital stock.....	\$2,192,207
Funded debt.....	1,008,400
Accounts and balances.....	110,892
Profits and loss.....	786,812
Total.....	\$4,078,418
Road and equipment.....	\$3,613,081
Trustees of sinking fund.....	806,261
Stocks and bonds.....	61,426
Accounts and balances.....	67,893
Cash.....	129,787
Total.....	\$4,078,418

Stock was increased \$109,807 and bonds \$451,000 during the year. The funded debt includes \$936,000 gold 7s, \$221,400 sterling 7s and \$451,000 general mortgage 5s.

The earnings for the year were as follows:

	1884-85.	1883-84.	Inc. or Dec.	P. c.
Freight.....	\$425,979	\$412,993	I. \$12,986	3.1
Passage.....	280,852	271,461	I. 9,391	6.8
Mail, etc.....	109,126	103,560	I. 5,566	5.4
Total.....	\$825,957	\$788,014	I. \$37,943	4.7
Expenses.....	451,616	403,383	I. 48,233	8.4
Net earnings.....	\$374,341	\$384,631	D. \$10,290	2.6
Gross earnings per mile.....	4.168	3.980	I. 0.188	4.7
Net.....	1,884	1,488	I. 396	26.6
Per cent. of exps.....	54.7	62.6	D. 7.9	

Renewals last year included 22.52 miles of steel rails, 64,923 new ties and new ballast on 32.46 miles of track. Only 14.7 miles of the main line are now laid with iron.

The result of the year was as follows:

Net earnings, as above.....	\$374,341
Interest, dividends, etc., received.....	29,938
Total.....	\$404,279
Interest paid.....	\$79,365
Dividends, 8 per cent.....	166,592
Total.....	\$245,957

Balance, surplus for the year.....
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